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Europe Report

SCIENCE AND TECHNOLOGY

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4 SEPTEMBER 1986

EUROPE REPORT

SCIENCE AND TECHNOLOGY

WEST EUROPE

EAST EUROPE

COMPUTERS

MICROELECTRONICS

/7310

BRIEFS

NEW FRENCH MATERIALS CENTER--Within 18 months Pechiney will inaugurate a research center in Aix-en-Provence that will be entirely dedicated to new technical materials, thus confirming its strategy in this sector. Initially it will include 24 researchers--half of whom will be recruited outside the [Pechiney] group--and it will enjoy extensive basic research facilities. Its task is to acquire scientific and technical know-how in all the sectors of the materials industry. This center, which is likely to expand, will cooperate with the group's subsidiaries that are focused on metal and high-tech ceramic manufacturing. [Text] [Paris L'USINE NOUVELLE in French 5 Jun 86 p 47] 25026/12223

CSO: 3698/A171

FRANCE'S SEP RECEIVES NEW LEADERSHIP

Paris L'USINE NOUVELLE in French 12 Jun 86 p 53

[Article by Jean-Pierre Casamayou: "SEP Pub Back Into Orbit"; first paragraph is L'USINE NOUVELLE introduction]

[Text] SEP (European Propulsion Company) has experienced a difficult awakening following Ariane's failure. With a new chief executive officer and enjoying excellent financial health, the company should move from experimentation to industrialization while continuing its diversification.

The new chief executive officer, Jean Sollier, who at the age of 53 takes SEP's destiny in hand could not have arrived at a more delicate moment. Ariane's failure, due to the non-ignition of the HM-7 engine developed by SEP, will have to be overcome quickly. Jean Sollier will also be anxious to restore calm among his colleagues who were troubled by Roger Lesgards' departure. That is why initially he will have to focus his efforts on the industrialization of Ariane engines.

The first task will be to succeed finally in moving from quasi-experimental production to mass production. Based on the commercial successes of Arianespace (six launchings per year), SEP, which supplies six engines per launcher, ought to be able to keep up its pace. A pace that resulted in a 56-percent increase in business in 1984 and 66 percent last year. More accustomed to experimental production, the company had to learn to solve problems of industrialization, pricing, and deadlines in a few short years. To help in this effort SNECMA [National Company for Aircraft Engine Studies and Construction], which has had exceptional success in the mass production of high technology products, has become its principal shareholder alongside Aerospatiale, L'Air Liquide, and Pechiney.

It seems that industrialization and meeting deadlines are not yet entirely mastered. This is true in spite of the major investments in personnel and equipment which have completely changed the Vernon factory, responsible for the Ariane engines. Nevertheless, in the eyes of Frederic d'Allest, Arianespace's director, the latest space failure is more a question of design than production problems. Still an important industrialization effort must be made. Jean Sollier, who reorganized Hispano-Suiza (a SNECMA subsidiary) in 1981, is convinced of that. Responsible for the SNECMA subsidiaries since

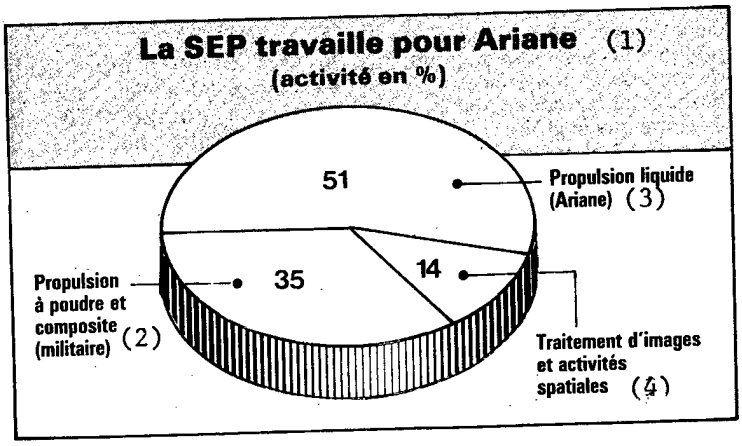
1983, the former assistant managing director of the engine manufacturer has had the opportunity to formulate an opinion. He will be backed by Jean Benichou, SNECMA's chief executive officer, who thinks that "SEP should rely more on SNECMA's industrial structure."

Giving new confidence to the company is the second task facing SEP's new boss. By emphasizing production, he hopes to change the mentality of the personnel, who are used to the production of prototypes. He will manage this mission within a healthy company which did excellent business in 1985. The turnover has grown by 25 percent, the profits have gone up from Fr 15.5 million to Fr 25.9 million and, 1 year after its introduction on the Second Market, shares have jumped from Fr 350 to Fr 1,700. Moreover, at Fr 3 billion, orders exceeded expectations. All this assures a healthy workload for SEP, which is going to increase the manpower of the Vernon factory by about 100 employees for the second consecutive year.

A Future in Ceramic Composites

Business is assured in both the short- and the long-term. On the one hand, because SEP remains the sole supplier of engines for Ariane 4 and also because it continues its military activities while developing its image processing business. The solid propulsion division specializes in missile propulsion units for Matra and for the nuclear force. Today the M-4, tomorrow Hades and certainly the SX. On the other hand, SEP, has begun highly promising diversification with ceramic composites which, within EUREKA, includes a project for a thermal engine and for shielding of the Hermes spacecraft. The other success is in carbon/carbon technology used in aircraft brakes and...in Formula 1 brakes. Orders for 7,000 disks have already been received. The image processing activity is linked to the growing success of the SPOT satellite.

Table 1. SEP's Various Activities: Fr 2,262 Million Last Year



Key:

1. SEP Works for Ariane (share in percentage terms)
2. Solid propulsion and composites (military)
3. Liquid propulsion (Ariane)
4. Image processing and space activities

25021/12859
CSO: 3698/A177

FIAT-MATRA TO MERGE AUTO COMPONENTS ACTIVITIES

Paris LA TRIBUNE DE L'ECONOMIE in French 27 Jun 86 p 6

[Text] Silence gives consent. The government had 60 days to veto the merger of the automotive component activities of Fiat and Matra, or to accept it. That time has elapsed without the government's having indicated its opinion, which is equal to a governmental green light. A spokesman of the Ministry of Finances has furthermore recognized that this position meant a tacit agreement.

Solex and Jaeger, on one side, and Veglia and Weber, on the other, will hence be merged within a new company in which 65 percent of the capital will be held by Fiat and 35 percent by Matra. Carburetors and dashboards in the same bag, firmly held by the Agneli family which, in a single stroke, awards itself 50 percent of the European market in the first case and 40 percent in the second. Matra is undoubtedly the poor relation.

This concentration has a simple explanation: the competition of Bosch and several other large automobile equipment firms. But whether we wish it or not it marks a retreat of France in a leading sector. A sector which is assuming more and more weight in the automobile industry, if only because it constitutes a fantastic research melting pot. Expensive at the start, but very profitable at term.

Fiat, which is constantly multiplying its agreements in all directions, has understood it very well. And this operation, which occurs barely days after Carlo de Benedetti's seizure of Valco, provides Italy with a dominant position in a key sector of the automotive industry. The future of this industry in Europe will benefit from it, but the self-esteem of France suffers a shock. This explains without any doubt whatsoever the calculated silence of public officials. This also explains Fiat's inflexibility in refraining from making the least commentary during the 60-day waiting period, for fear of irritating the sensibility of French industrialists and politicians.

There remains a thin screen in the French government behind which it can be sheltered for some time yet. In fact, in order to finalize its agreement Fiat must wait until the denationalization of Matra becomes effective. But it's only a matter of stepping back to jump better. The operation will be accomplished. And will lead to a group employing almost 20,000 persons and

producing a revenue of nearly 7 billion francs. Certainly a mastodon even if some border revisions are required. Solex, in particular, loses money (104 million francs last year) whereas Jaeger is just about out of the red.

However, Fiat still hasn't said anything concerning the manner by which it intends to reanimate the overall group and make it completely competitive. And that is what frightens French automobile manufacturers who have already clearly shown their reticences. The guarantees proposed by the Italian giant have not convinced them. They are afraid of being sooner or later shunted aside.'

13112/12795
CSO: 3698/605

BRIEFS

RENAULT 'COMPETITIVENESS' PLAN--On 24 June the management of Renault Industrial Vehicles (RVI) presented a "plan for increasing competitiveness" to the central enterprise committee meeting in Lyon. In particular, this plan comprises 2,624 layoffs between now and the end of 1987, and a reorganization of the plants around their essential activities (for example, machining of six-cylinder engines will be progressively transferred from Limoges to the Lyons region, the plant being devoted to small-scale production) and the termination of certain work places, like Suresnes and Courbevoie in the Paris area, L'Isle-d'Abeau in the Rhone-Alpes area, and later on undoubtedly Montplaisir and Feuilla in Lyons. The company is continuing its efforts in management cutbacks and cost reduction. "This plan is a decisive phase for placing us at the same competitiveness level as manufacturers like IVECO or Daimler-Benz and for arriving at the financial equilibrium that we have fixed for 1988," declared Philippe Gras, chairman of the board of the company, following the meeting. To protest against the layoffs, of which only 1,260 can be effected by preretirement or return of foreigners to their country, the CGT and the CFDT had called for work stoppages of 2 or 3 hours depending upon the plants. According to management, an average of 20 percent of the personnel participated (40 percent at Limoges). The CGT delegates left the CCE [central enterprise committee] meeting and, at the CGT call, 400 persons joined in a demonstration. [Text] [Paris LE MONDE in French 26 Jun 86 p 24] 13112/12795

CSO: 3698/605

DANISH BIOTECH COMMISSION ESTABLISHED, 500 MILLION KR BUDGET

Copenhagen INFORMATION in Danish 16 Jul 86 p 6

[Commentary by Minister of Education Bertel Haarder: "On the Way with Biotechnology; the Government Has Set Aside 500 Million Kroner for New Research Activity and Will Establish an Independent Genetic Engineering Council"]

[Text] Modern biotechnology has opened up totally new possibilities which we must seek to exploit. Denmark has special qualifications in the fields of agriculture and fishing and in a number of biotechnology industries. With this we have good cards in our hands in our efforts to become a pioneering country in a "green revolution." Research and development can create the basis for totally new businesses based on "green" technology. Disease prevention can take place on an improved basis, and many of the environmental problems which the technology used now entails can be totally eliminated.

In the action plan for research and development submitted by the government, 500 million kroner have been set aside during the period 1987-1990 for the strengthening of biotechnology here at home. We anticipate that an equivalent increase in effort in research and development will take place at the same time in the private realm, so that the results of the combined activity will be able to be traced more rapidly than usually in production methods, products, etc.

We are not unprepared. A building up of expertise has taken place over a number of years at universities and research institutions. Business firms and branches of industry exist which are in full swing with exploiting the new possibilities.

The industry, agriculture and education ministries in November 1985 solicited from three special experts their bids for the requirement of a national biotechnology research and development program. Already about 1 February 1986 the result was at hand in the form of the now much discussed "Green Woodpecker Report," which formed the basis for the government's further deliberations.

A major problem has been how quickly the research sector can be developed, and whether it is possible to find researchers and candidates with the

necessary professional qualifications. Some have suggested that considerably more than 500 million kroner be set aside for the program over a four-year period, but there are limits to how quickly it is possible to expand if quality is to be maintained.

A biotechnology coordination committee will be appointed in the immediate future, which will receive the responsibility for the upper-echelon organization of the program. The committee will come to consist of people with research and/or business expertise in the field and representatives from those ministries which have considerable interests in the program.

The plan is that research activities will be concentrated to begin with at a smaller number of research centers, which are expected to be located where qualified research circles exist beforehand.

The establishment of research centers will take place after a round of invitations to submit bids, which it is expected those qualified and interested will join. In order to receive the status of a research center it will be a prerequisite that joint effort agreements be established across existing sectors, between university institutes, sector research institutes and business firms. A decision will be made as to where the centers are to be established and how many of them there will be, on the basis of the proposals which are received. It is important to emphasize that a center does not mean the establishment of a new institution with new bricks, but an effective organization with an agreement regarding close cooperation for the solution of more precisely defined problems. The invitation to submit bids is expected to be begun directly after the summer vacation.

Denmark is the first country to have enacted legislation on gene splicing.

In the last Folketing session the government made motions in the Folketing signifying that the job of regulating the use of the new technology will be assigned to the proper authority. In other words, the legislation and administration are being integrated in the existing regulations, which have already been structured in order to safeguard the work environment and protect the environment from harmful effects. What comes under the Labor Ministry will be handled there. What comes under the Environment Ministry will be handled there, etc. In other words, things will be in the right places.

The government will establish, as something very important, a /genetic engineering council/ [in italics], which will consist of independent experts. The council's duties will be to follow Danish and international developments in the genetic engineering field. The council will assess the longterm prospects, both for industrial use and with respect to safety, and on this basis the council will advise the government regarding the initiatives which developments will provide an occasion for.

The council will be put under the Education Ministry, which is certainly the ministry which is most closely associated with the latest research and knowledge in the field.

The government's motions signify that a system of regulations has been created which guarantees quick and safe decisions. This is necessary for two reasons. Firstly, because researchers must not--for example, because of time-consuming and elaborate approval procedures for individual products--be prevented from taking part in the foremost front line of international cooperation. Secondly, because such a system of regulations will create the necessary assurance that harm to human beings and the environment will be avoided, since now a decision will be come to as to possible risks from case to case. Henceforth the people will not have to feel any insecurity about the growing effort in the field.

Before the biotechnology progam is begun, the government will give an account in the Folketing regarding the main elements of the combined program. With this, those interested will get an opportunity to become acquainted with what is taking place.

Jytte Hilden revealed in a statement to INFORMATION on 19 June that she to some extent lost the general idea of the plans the government submitted in the biotechnology field. By the way, she is one politician who certainly has considerable interest in the issue.

She was the cosubmitter of a resolution motion to the Folketing regarding a biotechnology research and development program. The motion matched the proposals found in the "Green Woodpecker Report" and which were the basis of the government's deliberations.

Jytte Hilden thinks that there are too many proposals and committees. She suggests that all problems be solved in the new Technology Board. I will not deny the board's being able to devote its time to biotechnology, but the level of ambition should surely be brought into closer keeping with the board's assigned duties. In any case the board can replace neither the coordination committee nor the genetic engineering council.

In passing, Jytte Hilden comes once again to accuse the government of cutting back on appropriations for research. This myth is hard to destroy, even though the figures show something different. I would like to emphasize strongly that the appropriations in the action plan are new money which continues the intensification of research which has taken place since 1982 and which before the end of the century will result in a doubling of resources used for research in Denmark.

8831
CSO: 3698/588

FRANCE'S THOMSON RCM SETS UP FLEXIBLE WORKSHOPS

Paris L'USINE NOUVELLE in French 5 Jun 86 pp 93-94

[Article by Alain Dieul: "For Thomson-Radar One Key Word: Flexibility"; first paragraph is L'USINE NOUVELLE introduction]

[Text] Since 1983 Thomson's RCM department has invested Fr 80 million in setting up four flexible workshops: in Pessac, for the wiring of printed circuits; at Malakoff, for surface treatment, sheet steel work, and the production of bare printed circuits. The objective is to adapt to production variations.

To shorten its production cycle while maintaining high reliability, the RCM department (radar, countermeasures, and missile electronics) of the Thomson-CSF "Avionics and Systems" division has installed significant computer aided design and production methods.

Since 1983 this department has invested Fr 80 million in four flexible workshops: three at Malakoff, a Paris suburb, and one in Pessac, near Bordeaux. It is very expensive equipment, but it fits the production of the RCM department perfectly. The department is in fact developing ultrahigh frequency equipment, radar (notably for the Mirage 2000), and electronic combat systems. These products are characterized by short production runs and slow production rates (a few units a month over several years).

The RCM department must not only have a good knowledge of electronics, but also of conventional techniques: precision mechanics, quality brazing (essential in ultrahigh frequency), surface treatment, etc. These different requirements caused management to make important decisions. "In order to adapt to specification fluctuations, quantity variations, and the urgency of certain parts, we opted for flexible workshops. In addition automation allowed lower costs and improved quality through permanent control of processes," explains Jean-Claude Laville, director of the Malakoff production unit.

The Malakoff Workshop: A Model of Its Kind

The first flexible workshop to be installed was the one in Pessac. Designed by Thomson-CSF, it was constructed in collaboration with the Lefebvre-Otomat Company. Designed for the wiring of printed circuits, it has a capacity of 4,000 circuits per month. The different kinds of components are positioned

and then soldered automatically; at the end of the line, the circuit is tested. At Malakoff, since November 1984, the surface treatment workshop has been a model of its kind. Two thousand lots of parts are handled each month; these parts, which come from several machining workshops, are destined for different end-users. Some finishing procedures may require up to 25 elementary operations; they are all controlled by the data processing cell, which ensures real-time management of the workshop, as well as the control of production lines, and substrates (titanium, aluminum, or copper base alloys), the complex geometric shapes, the tolerances, and the thermal and climatic constraints require great expertise and perfect control of chemical and electrical parameters. "Automation has allowed doubling the workshop's capacity, and cycles were reduced from 8 days to 3 days for prototype parts," reveals Jean-Claude Laville.

Since the end of last year, the sheet steel workshop's goal has been to develop separate parts in precision sheet steel utilized in models. Cycles have been reduced from 15 to 3 days, and according to the complexity of the parts, cost has decreased from 0.7 to 2 times! This workshop is controlled by a DPS-6 computer linked to design systems assisted by the IBM Cadam computer. For programming this cell is equipped with four PC-350 microcomputers on which punching and bending programs are written. The punching cell consists of a numerical control punching machine, automatically supplied by a warehouse containing 25 types of sheet metal. A tool-changing robot has access to two magazines (i.e., more than 200 punches). This unit, which is completely soundproof, precedes a control and finishing cell.

Extremely versatile, personnel working in this workshop were recruited on a volunteer basis. "The training of workers took 2,500 hours. Today each operator is able to handle the entire process: from initial stages through quality control, via the writing of punching and bending programs," states Jean-Claude Laville.

The most recent creation is the bare printed circuit workshop. At this level, deadlines are of the utmost importance as the design department needs to validate the performance of equipment very rapidly. This workshop is therefore directed towards prototypes with mass production smoothing out costs. Now it only takes 2 weeks to make a CAD design and to produce a 10-layer printed circuit, despite its complexity. The density of internal connections requires 150-micron paths and 0.3-mm interconnecting holes. These requirements led Thomson-CSF to acquire the best performing equipment: from the phototracer permitting 25-micron conductors, to numerical-control drilling and clipping machines. As a final control an Orion tester checks the "professional electronics" quality level.

A fifth flexible workshop is already in the research stage: a Fr 15 million project whose goal is to produce milled parts in a cell equipped with high-performance mechanics.

[Box, p 94]

Thomson-Radar: A Department of the Avionics Division

With 8,000 people, its task is to study and develop airborne electronic equipment. Its achievements cover nearly the whole field of radars and countermeasures including indicator systems, instrument and missile electronics, optoelectronic systems and lasers, as well as flight control computers.

This range allows Thomson-CSF to play a major role, not only in French aeronautics programs, but also internationally in Airbus.

The "radar, countermeasure, and missile" department is, with more than 4,000 people, the largest in the avionics division, which also includes the "general avionics" and the "electromechanical components" departments.

25033/12859
CSO: 3698/A174

FRG PROJECTS WITHIN EUREKA FRAMEWORK

Projects Outlined, Common Norms Sought

Munich SUEDDEUTSCHE ZEITUNG in German 1 Jul 86 p 24

> [Text] British Prime Minister Margaret Thatcher opened the 3rd conference of ministers from the 18 nations participating in Eureka, the European push for innovation in research and technology, in London on Monday. She took the occasion to tell European industry that it would have to develop this initiative on its own. In a speech to about 40 ministers for foreign affairs and research, Mrs Thatcher urged that Eureka should not be regarded as a source of money, but rather that the governments of the nations involved should restrict their activities to supporting industry in its efforts.

At the third Eureka conference the chair passes from Great Britain to Sweden. Eureka had started under French and German chairmanship. About 60 projects are expected to be presented at the session in London, which will involve a varying number of companies from the participating nations.

Fels Heads the Office

The participating ministers for research, industry and foreign affairs had agreed that the administration for Eureka should have its headquarters in Brussels. The agreement, which was signed on the periphery of the conference, has as its objective the creation of secretariat with 12 staff members, which will collect information about cooperation within Eureka and pass it on to participants and interested parties.

The "small, independent secretariat" is to be headed by the French diplomat Xavier Fels. Fels will be assigned to the position and paid by the French government. The career diplomat has been entrusted with special assignments in the French postal service. Expenses for establishing the secretariat will be assumed by the Belgian government. This eliminates a Franco-German proposal, which would have set up the Eureka secretariat in Strasbourg, where all the Eureka member governments already maintain diplomatic representation on the Council of Europe.

In her speech, Mrs Thatcher had warned against the creation of a new bureaucratic apparatus. She called for a "streamlined secretariat," which would have to try to achieve the maximum results with the least expense. [Chancellor] Genscher stressed that Eureak had demonstrated surprising success and dynamism in its development since it was baptized 11 months earlier at the first Eureka ministers' conference in Paris. All the initial skepticism had now been refuted. Genscher said that Eureka was being followed with great interest in the United States and Japan, because it was being recognized that Europe was not satisfied with the role of licensee. Genscher also stressed the importance of of a unified European domestic market for new products, which could not stop at the borders of the EEC nations, but which would have to be open to all Eureka nations.

"Leap Across Borders"

In the view of Minister for Research Heinz Riesenhuber, the European Eureka technology group should give companies the signal to risk taking "the leap across borders." In an interview on German radio Riesenhuber pointed out that not all Eureak projects are being supported with state subsidies. It was more important to support coordination in research on a European basis, to create common standards, on the basis of which European industry could maintain a leading position in the world economy. He conceded that the funds invested in Eureka were "limited." Nevertheless, he maintained, the middle-class could be be encouraged with the research funds to align itself increasingly with technology. He emphasized that Eureka was a civilian program, in which there were no plans for military projects.

Fifteen New Projects

There are 15 projects involving German companies or research institutes among the 60 which were adopted in the Eureka program in London. This brings the number involving German participation to 19. Of the DM 485 million in subsidies, which would be allocated from the budget until 1995, DM 200 million alone would go to environmental protection projects and improving the infrastructure. The projects include:

--Research projects on protein analysis, which will find an application in biotechnology.

--The development of phase-reinforced ceramics for diesel engines.

--The development of welding technology for aluminum alloys and the creation of new multilaminate composite materials.

--The creation of a Eureka software factory, a production system that will tap the already existing reservoir of data processing programs.

--The creation of a system to monitor the physical, chemical and biological changes in European seas.

--The creation of a "thinking automobile" by using microelectronics and information processing in the European automobile industry, primarily to increase traffic safety.

--Development of a malaria vaccine.

--The creation of a new generation of screen-monitoring systems to supervise manufacturing in industry.

--The creation of an integrated system, involving the operating theater and intensive care station for highly automated hospitals.

Transportation Project Prometheus

Duesseldorf HANDELSBLATT in German 2 Jul 86 p 9

[Text] London, July 1--In 10 years, drivers in Europe will probably be at the steering wheel of an intelligent automobile that is safer and more economical than any previous model. A suitable across-the-borders research program has just been approved at a conference in London, along with 61 other projects, by the ministers from the 18 nations participating in the Eureka research program.

The cost for all 62 new projects was estimated at more than DM 4 billion. The program covers highly varied research projects, for example, a method of reducing the extent of environmental pollution in the Rhine basin, or the development of a ceramic engine. However, the emphasis is in the area of electronics and communications.

The FRG is participating in 15 projects, the total cost of which is put at Dm 1.6 billion. The German partners' share of this will be DM 625 million, of which the goverment will assume DM 484 million. France is the most active participant of all, participating in 40 research projects, followed by Great Britain with 29. The FRG is third.

Nineteen Eureka projects had already been approved by earlier conferences, four of which are being supported by German companies and institutes and substantial sums of tax money. Their cost might run as high as DM 850 million, of which the FRG is contributing DM 286 million. They include the Eurolaser research program, the development of high-performance laser systems for metal processing and manufacturing equipment. In one project, Eurotract, researchers want to discover the origin of toxins in the troposphere over Europe and where they settle.

Another environmental projects, which is being funded by the government, is Euromar, which has now been given approval. At DM 350 million, it is one of the most expensive of the projects that were just approved. Euromar will pursue the problem of the vertical transportation of material between the atmosphere, the sea and the sea bed and also study the exchange of water between the open ocean, shelf seas and coastal zones. Beyond that, it is also intended to create a scientific-technological basis for the identification and

monitoring of biological changes caused by natural fluctuations or artificial pollution. The proposed length of the study is 9 years.

The Prometheus project, in which the European automobile industry is participating, drew the most attention at the London conference. Of the German manufacturers, BMW, Daimler-Benz, Porsche and Volkswagen are involved. The goal of Prometheus is to develop designs and solutions for a traffic system which will have a higher capacity, be more economical, pollute less and permit a previously unattained measure of safety. The slogan is a conflict-free, human-oriented traffic system.

A computer will help the driver of the future to understand difficult situations. By means of an electronic exchange of information between automobiles and traffic signs, the driver will be given timely warning of danger. For example, multicar rear end collisions in fog can be avoided in the future, if the car involved in the accident transmits signals that can be picked up by all the following traffic.

Eureka does not have its own budget available. Expenses for the small secretariat in Brussels, which has just been approved, are being turned over to the participating countries, which also have the option of lending financial support to the companies involved in Eureka projects. France is prepared to bear 40 percent of the costs of Fr 4 billion accruing to French companies. The expected subsidies for this year of Fr 350 million will very probably double next year. The British government is prepared to carry up to one half of the costs on the British side, but it is not yet quoting any figures about the anticipated amount.

Most of the participating nations have so far not created separate budget allocations for Eureka, instead they are planning to support the research projects from the current research budget. The monies approved by the federal government are also coming from within the established budget framework. Minister for Foreign Affairs Genscher stressed in London that state contributions would have to take the form of subsidies. Minister for Research Riesenhuber would like to persuade the banks to make venture capital available at a later stage of development.

9581
CSO: 3698/580

GDR'S, CEMA'S ROBOTICS ACHIEVEMENTS, PROJECTS OUTLINED

Paris ZERO UN INFORMATIQUE in French 2 Jun 86 p 72

[Article by Josip Rajman: "Information Technology in the GDR: Increased Production for Robotron"; first paragraph is ZERO UN INFORMATIQUE introduction]

[Text] In Leipzig, the Robotron group presented its new wares. Moreover, East Germany would seem to be trying to boost its exports not only to socialist countries, but to the rest of Europe as well.

At the Leipzig Spring Fair, held from 16 to 22 March, Robotron exhibited an operational integrated electronic office jointly with the Electronic Communications group. This office includes new programs such as Tabcalc, an equivalent of Lotus 1-2-3 and Symphony. Also noteworthy were local area networks, optical-fiber data transfer systems, image identification systems, and complex office automation systems.

During the past 5 years, Robotron results have shown a marked increase. Compared to 31 December 1980, production has risen by almost 150 percent, or 2,500 million marks. Exports increased by more than 56 percent to socialist countries and by 55 percent to others.

France, for its part, purchased some 35,000 Robotron typewriters in 1985, as well as assorted office equipment such as printers, calculators, and plotters (Reiss). By tradition, certain African countries also import adding machines, typewriters (arabicized or bilingual), and calculators from the GDR. Algeria is the largest importer.

More than 100 million circuits are reportedly produced in the GDR every year. More than 350,000 microcomputers and more than 10,000 robots, including handling robots, are said to exist in the GDR today. France, for its part, is said to be importing microcomponents from the GDR.

Finally, CEMA has just set up a new joint robotics organization. Known as Interrobot, it is intended to coordinate and rationalize research and manufacturing in the robotics area.

Five other technological development programs exist within CEMA today. They concern electronics (principally microelectronics), complex automation, nuclear energy, advanced materials, and biotechnology. This form of cooperation is said to have many points in common with EUREKA.

25046/12859
CSO: 3698/A179

PARALLEL ARCHITECTURE FOR HIGH-SPEED RUNNING OF PROLOG PROGRAMS

Budapest INFORMACIO ELEKTRONIKA in Hungarian No 2, 1986 pp 63-73

[Article by Dr Peter Kacsuk, a scientific worker at the SZKI (Hungarian Computer Research and Development Center): "Model of Parallel Architecture for High-Speed Execution of PROLOG Programs." The first paragraph is the Hungarian language summary.]

[Excerpt] Theme codes: 30 (programming methods), 18 (modeling).

In recent times--in connection with development of fifth generation computer systems--very intensive studies have been made of architecturally supported, efficient implementation of the PROLOG language. In general an attempt is made to increase efficiency by parallel running of resolution theorem proofs. In the first part of the article the author summarizes the most important properties of demand driven computing models. In the second part he introduces a demand driven model suitable for parallel control of PROLOG programs. (It is not possible to use recursive rules in the model because of its static character.) In the third part he examines how it is possible to map PROLOG programs into a homogeneous processor space on the basis of the demand driven model. The proposed solution can be used effectively in numerous classes of tasks.

2. A Static Demand Driven Model for Parallel PROLOG Control

In what follows we will describe a static demand driven computing model which makes possible the use of all parallel control methods, with the exception of AND parallelism, in the course of executing PROLOG programs.

We have introduced four types of operators to realize a parallel PROLOG interpreter program:

[The symbols shown, column 1, page 66, are: TEST, a diamond with two inputs and one output; SOURCE, a circle with one input and one output; OR, a half circle with two inputs going through to one output; and AND, a half circle with two inputs terminating in "1" and "2" and one output.]

A data flow graph of PROLOG programs can be compiled from the four operators. For example, let us look at the following simple PROLOG program:

```
(1)  a(X,Y)<b(X,Y)&c(X).
(2)  b(lemon,Y)<e(Y).
(3)  b(X,Y)<d(X,Y)&f(Y)&g(X).
(4)  b(apple, plum)<
(5)  c(apple)<
(6)  c(pear)<
(7)  d(apple, pear)<
(8)  d(pear, plum)<
(9)  e(orange)<
(10) e(pineapple)<
(11) f(pear)<
(12) f(plum)<
(13) g(pear)<
```

[Translator's note: In the above program and throughout the text below the symbols < and > denote the directions of arrows.]

Figure 2 shows the data flow graph for the program. The data flow graph can be built up systematically from the PROLOG program with the aid of the following mapping rules.

1. Statements of fact must be mapped into the SOURCE operators.

2. The head of the deduction rule must be mapped into the TEST operator.

3. The body of the deduction rule is mapped as follows:

(a) If the body consists of N part goals, then the part goals (N-1) must be tied into a chain by the AND operator. The output of the first AND operator of the chain must be tied to the input of the TEST operator signifying the head.

(b) If one can find M identically headed deduction rules or identically named statements of fact for any part goal of the body then these must be tied directly to the location of the part goal (M-1) with the aid of the OR operator.

The static nature of the model follows from the fact that it does not contain a procedure-calling operator. Mapping rule 3b reflects this property. We permit three types of loading movements in the data flow graph created on the basis of the above mapping rules.

1. DO: Demand type loading, which moves in the opposite direction to the arrows in the data flow graph. Its role is to activate the operators of the graph needed to solve a given part goal. The difference compared to normal demand driven models is that it also carries data information, which contains the currently valid argument values (variable fixes) at the time the given part goal is called.

2. FAIL: A data type loading, which moves in the same direction as the arrows. It indicates the unsuccessful deduction of the given part goal.

3. SUCC: A data type loading, which indicates the successful deduction of the given part goal, and contains the variable fixes created in the course of the deduction.

In regard to their structure the loadings consist of three parts:

1. the type of loading, which can be DO, SUCC or FAIL,
2. the call environment of the loading, and
3. the variable fixes transported in the loading (this part is absent in the case of FAIL loading).

Definition of the functioning of the operators:

1. The TEST Operator

The TEST operator stores the arguments (formal parameters) prescribed for the head of the deduction rule. The "grounded" input arrow symbolizes this. As the result of a DO loading arriving at the output it performs sample interpolation between the stored formal parameters and the current parameters arriving in the loading. If the sample interpolation was successful then it puts a DO loading at its input (as a demand type loading the DO loading moves in a direction opposite to the arrows) which contains at its output, in addition to the variable fixes stored in the DO loading which has been expended, the variable fixes created in the course of the successful sample interpolation. If the sample interpolation was unsuccessful then it places a FAIL loading at its output. It copies without change onto its output a FAIL or SUCC loading arriving at its input. Thus, with the aid of a sample interpolation algorithm, the TEST operator filters the activating demand loadings but passes through the data loadings without change.

The formal description of the functioning of the TEST operator is as follows:

```
if DO (p) > output THEN IF successful interpolation
                         THEN DO (p*) > input;
                         ELSE FAIL > output;
if FAIL > input THEN FAIL > output;
if SUCC (p) > input THEN SUCC (p) > output;
```

where "output" means the output arrow, "input" means the input arrow, "(p)" means the arguments (variable fixes) transported in the loading and "(p*)" means the interpolated arguments.

2. The SOURCE Operator

The SOURCE operator stores the arguments of the statements of fact assigned to it. The "grounded" input arrow symbolizes this. (Let us note that these stored arguments are the elements of a PROLOG database!) If the SOURCE operator senses a DO loading at its output, then it performs the sample interpolation between the arguments stored in it and the variable fixes transported in the

DO loading. In the event of successful interpolation it puts a SUCC loading on its output, in which it gives back the variable fixes created in the course of the sample interpolation. After issuing the SUCC loading it also places a FAIL loading on its output. This--as we will see--plays a role in the formation of the loading sequences. If the sample interpolation is unsuccessful the SOURCE operator puts a FAIL loading on its output.

The formal description of the functioning of the SOURCE operator is as follows:

```
if DO (p) > output THEN IF successful interpolation
                            THEN SUCC (p*) > output;
                                 FAIL > output;
                            ELSE FAIL > output.
```

3. The OR Operator

In essence the OR operator plays a loading distribution function. It copies to both its inputs a DO loading arriving at its output. It immediately expends a SUCC loading arriving at either input and copies it to its output. If a FAIL loading arrives at either input then it does not expend it until a FAIL loading appears at the other input. Then it expends both FAIL loadings and puts a FAIL loading on its output.

The formal description of the functioning of the FAIL operator [as published, "OR operator" must have been intended] is:

```
if DO (p) > output THEN DO (p) > input 1;
                        DO (p) > input 2;
if SUCC (p) > input i THEN SUCC (p) > output;
If (FAIL > input 1) AND (FAIL > input 2) THEN FAIL > output.
```

4. The AND Operator

If a DO loading arrives at the output of the AND operator then it copies it without change to its input 1. As the result of the arrival at its input 1 of the loading sequence SUCC 1, SUCC 2,... SUCC N, FAIL it generates for every single SUCC i (p) loading a DO (p) loading for its second input arrow. If N=Ø, that is if it immediately gets a FAIL loading at its first input, then it copies this to its output and does not send a DO loading to its second input.

As the result of the arrival at its second input of the loading sequences (SUCC,... SUCC, FAIL)1... (SUCC,... SUCC, FAIL)N it copies the SUCC loadings to its output. It throws out the FAIL loadings, with the exception of the one belonging to the Nth sequence. As the result of that one it puts a FAIL loading on its output, indicating that it can no longer produce a successful solution of the part tree of the search tree belonging to it.

The formal description of the functioning of the AND operator is:

if DO (p) > output THEN DO (p) > input 1;
if SUCC (p) > input 1 THEN DO (p) > input 2;
if (FAIL > input 1) AND (SUCC-loading-was-not-earlier) THEN FAIL > output;
if SUCC (p) > input 2 THEN SUCC (p) > output;
if (FAIL > input 2) AND (it-belongs-to-last-loading-sequence) THEN FAIL > output.

We will show below that with the operator and loading types defined above one can achieve the following three types of parallelism in execution of PROLOG programs:

--search parallelism,
--OR parallelism, and
--data flow parallelism.

In the course of the proof we will presume that the modeled supporting architecture is ideal in the following sense:

a. The number of processors available is unlimited, that is, a different processor can be assigned to every node of the data flow graph describing the PROLOG program.

b. The local storage of every processor is sufficiently large to carry out the following tasks:

--store the arguments of the SOURCE and TEST operators,
--store the programs of the algorithms assigned to the operators.

c. Every processor has sufficiently large input buffers. This will ensure that the number of loadings on the arrows of the data flow graph is not limited.

On the basis of all this the proof of the parallel control possibilities of the model is as follows.

1. Search Parallelism

Assertion: The model described makes it possible to realize search parallelism.

Proof: Search parallelism can be guaranteed as a result of the assumptions made in points a and b. On the basis of these assumptions every statement of fact can be placed physically in separate storage and thus parallelism can be attained.

2. OR Parallelism

Assertion: The model ensures the realization of OR parallelism.

Proof: OR parallelism means that the branches starting from the OR apex of the search tree can followed in parallel. This is made possible by OR operators which can be tied into a chain (cascade). Let us presume that N branches, or part trees, start from some OR apex of the search tree. (This means that the part goal indicated by the OR apex can be interpolated with N inference heads or statements of fact.)

The mapping of the OR apex in our model is as follows:

[The figure shown, column 2, page 68, presents three OR operator symbols; reading from right to left, following the arrows but recalling that the DO loadings move against the directions of the arrows, the inputs for the first are (N-1) branch and N branch; the inputs for the second are the output of the first and branch 2; the inputs for the third are the output of the second and branch 1.]

Since the OR operator copies the activating DO loading arriving at its output to both of its inputs the DO loading will travel through the chain and a DO loading will appear on the input arrow symbolizing every single branch, starting from the OR apex of the search tree.

[The figure shown, column 1, page 69, adds the DO arrows, running from left to right, to the previous figure.]

The DO loadings created in this way activate in parallel all the part trees starting from the OR apex, which was the condition for OR parallelism.

3. Data Flow Parallelism

The SOURCE and AND operators play a crucial role in realizing data flow parallelism. To understand the process we must make more precise the already mentioned cocept of a loading sequence in the case of the AND operator. We mean by a loading sequence a sequence of loadings in which N number of SUCC loadings are followed by one FAIL loading, and all (N+1) of the loadings belong to the same call environment, that is, they have come into being as a result of the same DO activating loading. We say that the loading sequence is reduced if N=Ø, that is, the loading sequence consists of a single FAIL loading.

Assertion: Only loading sequences can move in the data flow graph in the same direction as the arrows.

Proof: We will show that every operator puts a loading sequence at its output. Only SOURCE operators are capable of creating SUCC and FAIL loadings. These always create a loading sequence as a result of a DO loading: in the event of a successful interpolation they create a SUCC, FAIL sequence and in the event of an unsuccessful interpolation they create a reduced loading sequence. The OR operator edits loading sequences arriving at its inputs into a single loading sequence at its output. This follows from the fact that a FAIL loading is put at its output only if it finds a FAIL loading at both of its inputs. It follows from the definition of the AND operator that it always puts a loading sequence at its output if loading sequences arrive at its inputs. Since the TEST operator copies onto its output without change loadings arriving at its input it is also true of it that if a loading sequence arrives at its inputs then it puts a loading sequence at its output too.

Assertion: Data flow parallelism is realized in the model.

Proof: Data flow parallelism means that if the first i number of branches starting from the AND apex of the AND/OR tree (14) have already produced a solution then a tour of the (i+1)th branch can begin as well, and parallel with this the tour of the first i number of branches can continue in search of new solutions. The mapping of the AND apex in our model is as follows:

[The figure shown, the top figure in column 2, page 69, presents four AND operator symbols, the input-output arrows running from right to left and the DO arrows running from left to right. Reading from left to right "branch 1" or "part goal 1" is the input 1 of the first AND; input 2 of the first AND runs to the output of the second AND; input 1 of the second AND is "branch 2", and so forth until we find the "(i+1)th branch" as input 1 for the fourth AND in the figure. "DO 1" is shown as a reverse arrow between input 2 of the third AND and the output of the fourth AND; "DO 2" is shown as a reverse arrow between the preceding second input and the output of the third AND.]

The figure also shows a snapshot of the loadings in which the i-th AND operator has expended the SUCC 1 loading arriving at its input 1 and, as a result, has put a DO loading on the output of the (i+1)th AND operator. Meanwhile the deduction of the i-th part goal is proceeding, the (i-1)th part goal has found a new solution and has sent it in a DO loading to the i-th AND operator. The next figure shows the new loading arrangement coming into being as a result of the foregoing loading arrangement:

[The figure shown, the lower figure in column 2, page 69, presents two AND operator symbols. Reading from left to right, the input 1 of the first AND is sending a DO and receiving a SUCC 2 from the "i-th part goal" while the second AND is sending a DO in the direction of the "(i+1)th part goal".]

As a result of the DO loading arriving at its output the (i+1)th AND operator is activating the (i+1)th part goal by sending on the DO loading. The i-th AND operator, while producing the solutions of the i-th part goal on the basis of the prior solution received from the (i-1)th part goal, takes over the next solution of the (i-1)th part goal, and thus restarts the solution of the i-th part goal. In order for the i-th AND operator not to mix up the solutions of the i-th part goal which have come into being as a result of the various solutions produced by the (i-1)th part goal it is necessary to have an environment description field in the loading. The environment description fields in a loading sequence are the same and identify that DO loading as a result of which they came into being. The AND operator can sort out the loading sequences arriving at its second input on the basis of the concluding FAIL loadings, and this makes it possible for it to generate the correct loading sequence at its output.

Finally, let us describe the dynamic behavior of the model in one of the parts of the graph in Figure 2. Let the part to be studied be the part belonging to the deduction rule: (program line 3) b(X,Y)<d(X,Y)&f(Y)&g(X).

We will study the behavior of the part of the graph from the moment when the activating DO loadings have reached the d SOURCE operators. Let us designate this moment tp with a tØ and the moments following it with t1, t2,... tN. Let us also presume that each operator uses precisely one moment to process one

loading. In this case Figure 3 shows the loadings which have arisen during the first six moments. In the figure the loading sequences which belong together are tied together with a bracket. The loadings which have arisen illustrate the case where a DO (X=?,Y=?) activating loading has arrived at the input of the part of the graph. This loading passes through operators "A", "B", "C" to the output of the two "d" SOURCE operators. These simultaneously produce the loading sequences

SUCC (X=apple, Y=pear), FAIL, and
SUCC (X=pear, Y=plum), FAIL respectively.

From these the "C" OR operator produces at its output the loading sequence

SUCC (X=apple, Y=pear), SUCC (X=pear, Y=plum), FAIL.

As a result of this the "B" AND operator creates two DO loadings to activate the part tree belonging to the "D" AND operator. We leave to the reader the further tracking of the creation of loadings. The operation of the part of the graph can be followed further in Figure 4 in moments t7-t14. The result provided by the part of the graph as a result of the activating loading DO (X=?, Y=?) will be the loading series SUCC (X=pear, Y=plum), FAIL.

3. Mapping the Data Flow Graph Into a Processor Space

With the given operator and loading types the data flow graph makes possible the logically parallel running of PROLOG programs. In order for the operators of the data flow graph to operate in parallel physically as well the data flow graph must be mapped into a processor space which consists of a sufficiently large number of processors and data paths linking them (16). A processor space suitable for this might be a two-dimensional processor array where every processor has n number of neighbors with which they are linked by direct data paths. (If n=4 we get the well known array processors.) Homogeneous processor spaces with such a regular geometry are characterized by a very high degree of parallel operation execution ability (17). For this reason we selected this processor arrangement for parallel implementation of PROLOG programs. At the same time they have a significant disadvantage in that efficient mapping of programs on them is an extraordinarily difficult task; in many cases it cannot be done algorithmically.

In what follows we will show the algorithmic mapping of a data flow graph onto a two-dimensional, four-neighbor processor space with the aid of which even a PROLOG compiler program is capable of performing the mapping. Instead of direct mapping--where only one operator is assigned to one processor--we chose a sort of mapping where several operators of the data flow graph can be assigned to one processor. This mapping method provides the following advantages:

1. One can map even large PROLOG programs into a processor space containing a relatively small number of processors.

2. The degree of utilization of the processors improves substantially compared to direct mapping. Statistically the loading of the processors can be expected to be even.

3. We can leave out here the space filling operators which become necessary in the case of direct mapping.

4. One can easily provide a systematic algorithm for the mapping.

It is a disadvantage of the mapping method that it reduces the parallelism provided by the model. But the reason for this is simply that instead of the ideal architecture hypothesized by the model, an architecture with an unlimited number of processors, we have switched to an architecture with a limited number of processors for the sake of realizability.

It leads to a further increase in the degree of utilization of the processor space and to a reduction in the data traffic among processors if we imagine every single processor of the X-Y plane two-dimensional processor array as a column of K number of processors positioned in the Z direction. In this way a N x M two-dimensional processor array simulates a N x M x K three-dimensional processor array. The data flow graph can be mapped onto a three-dimensional array processor formed in this way by directing the input-output arrows of the operators in the way which can be seen in Figure 5.

As a result of mapping on the basis of three-dimensional directions one gets a "layered" direct mapping in which direct mapping is realized in the X-Y plane but in the Z direction a number of different type operators can be assigned to one physical processor, as is shown in Figure 6 in the case of mapping a simple PROLOG program. In this way every processor is capable of executing any operator function (the local storage of the processors stores the program for each operation), but at any one time one processor runs only one of the operators assigned to it, namely the one which is capable of being fired in the sense of the firing rule. If the processor does not have such an operator then it waits for a message to arrive from its neighbors which will activate some operator. If several of its operators are capable of being fired at the same time then it fires them one after another according to some scheduling strategy. So every processor in the processor space is capable of operating in parallel with the others; it is simply activated in an asynchronous way by messages arriving from its neighbors.

One of the advantages of the mapping shown in Figure 5 is that the OR branches belonging to one part goal are really formed in parallel in the X-Y plane. Another advantage is that the AND operator chains form in the direction of the Z axis, so one processor executes them, as a result of which the data traffic taking place in these chains does not appear between processors.

In addition to the array processor there is need for a servicing (host) processor which must take care of compiling the PROLOG programs and mapping them into the array processor. Those part trees of a search tree of a PROLOG program which contain global operations with side effects (e.g., addclause, delclause, etc.) or which contain recursive calls cannot be mapped on the basis of the static model described. For this reason one can expect that only

certain part trees of a PROLOG program will be mappable into the processor space. This means that a servicing processor will also be needed to run the part trees containing global operations. Figure 7 shows the structure of the complete PROLOG system. The PROLOG array processor plays a similar role in the processing of PROLOG programs as the so-called systolic array processor (17) does in processing programs requiring much computation; that is, it processes certain frequently used part tasks in parallel, with great speed.

Conclusions

The proposed parallel architecture model has a number of advantages:

--Every parallelism with the exception of AND parallelism can be exploited in the model.

--The model can be adequately used on a planar array processor, as a result of which both the operation of the processors and the data transmission between processors are parallel.

--Since several logical operators can be assigned to one physical processor it can be expected that the degree of utilization of the processors will be statistically more even and more continuous.

--A systematic algorithm for the compiler program makes possible the mapping of the search tree into the processor space.

--The database of the PROLOG program appears in the local storage of the processors in a completely distributed way, which greatly accelerates access and processing.

It is a disadvantage of the model that because of its static nature it is not capable of solving recursive inference rules. For this reason the model cannot be used in artificial intelligence applications. But the static nature of the model is not a disadvantage in expert systems--where recursion occurs only rarely. We can draw similar conclusions about the utility of the model if we study its data traffic needs. Since the entire data structures giving the value of variables must be stored in the variable fixes transported in the loadings the model could be used only with bad efficiency in artificial intelligence applications working with large lists. Large lists are not typical in expert systems, so the model described can be regarded as suitable there.

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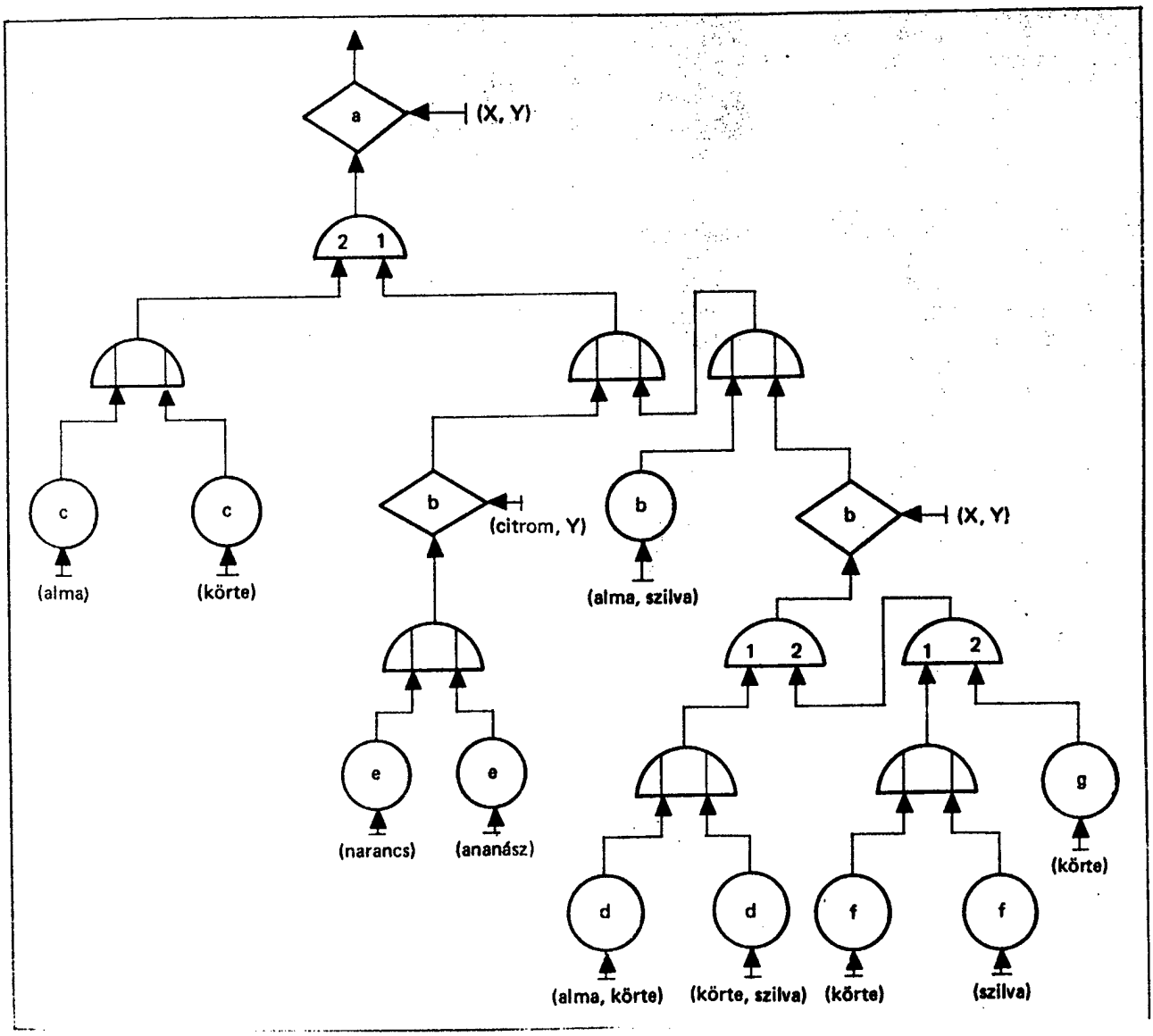
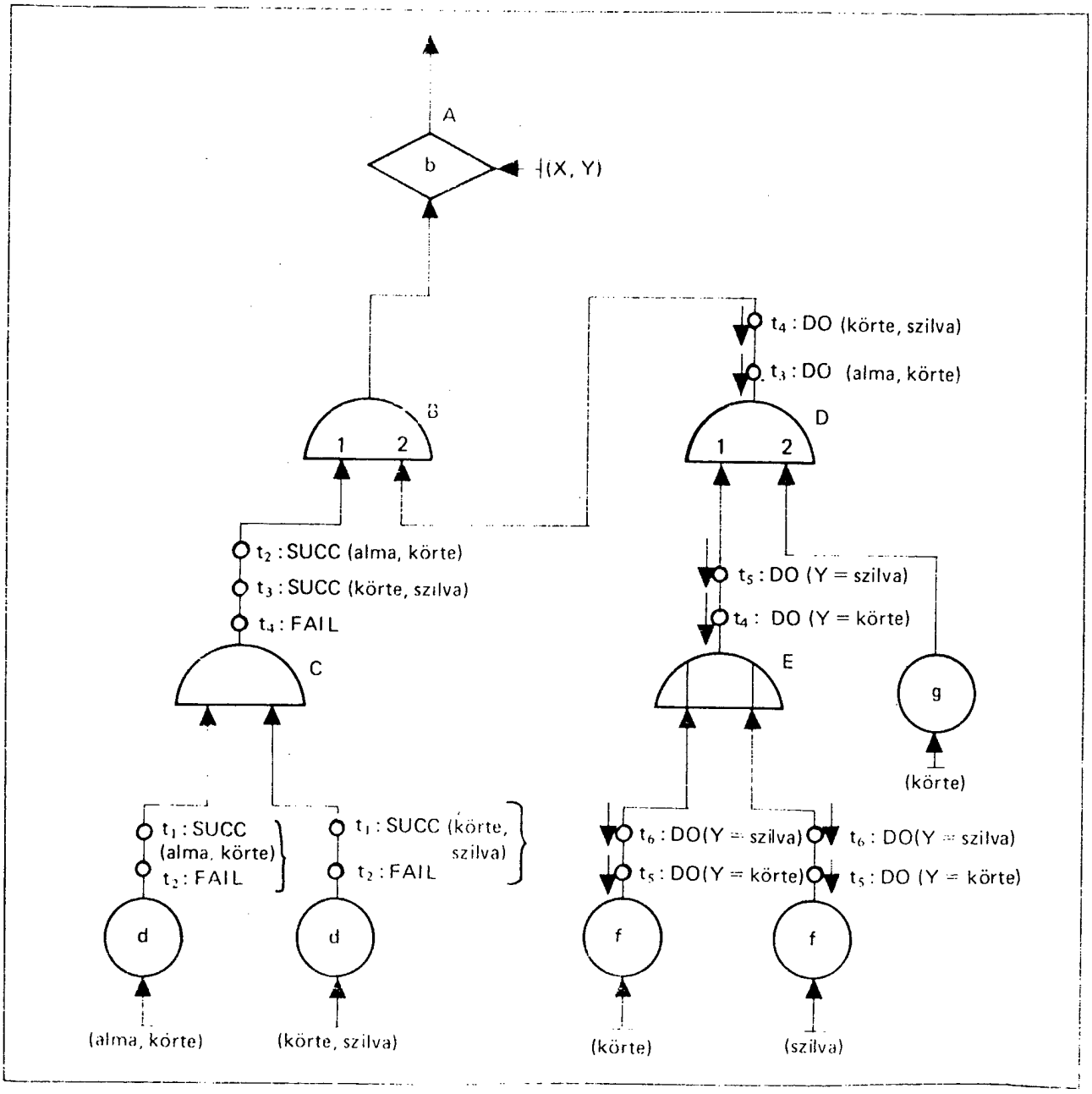
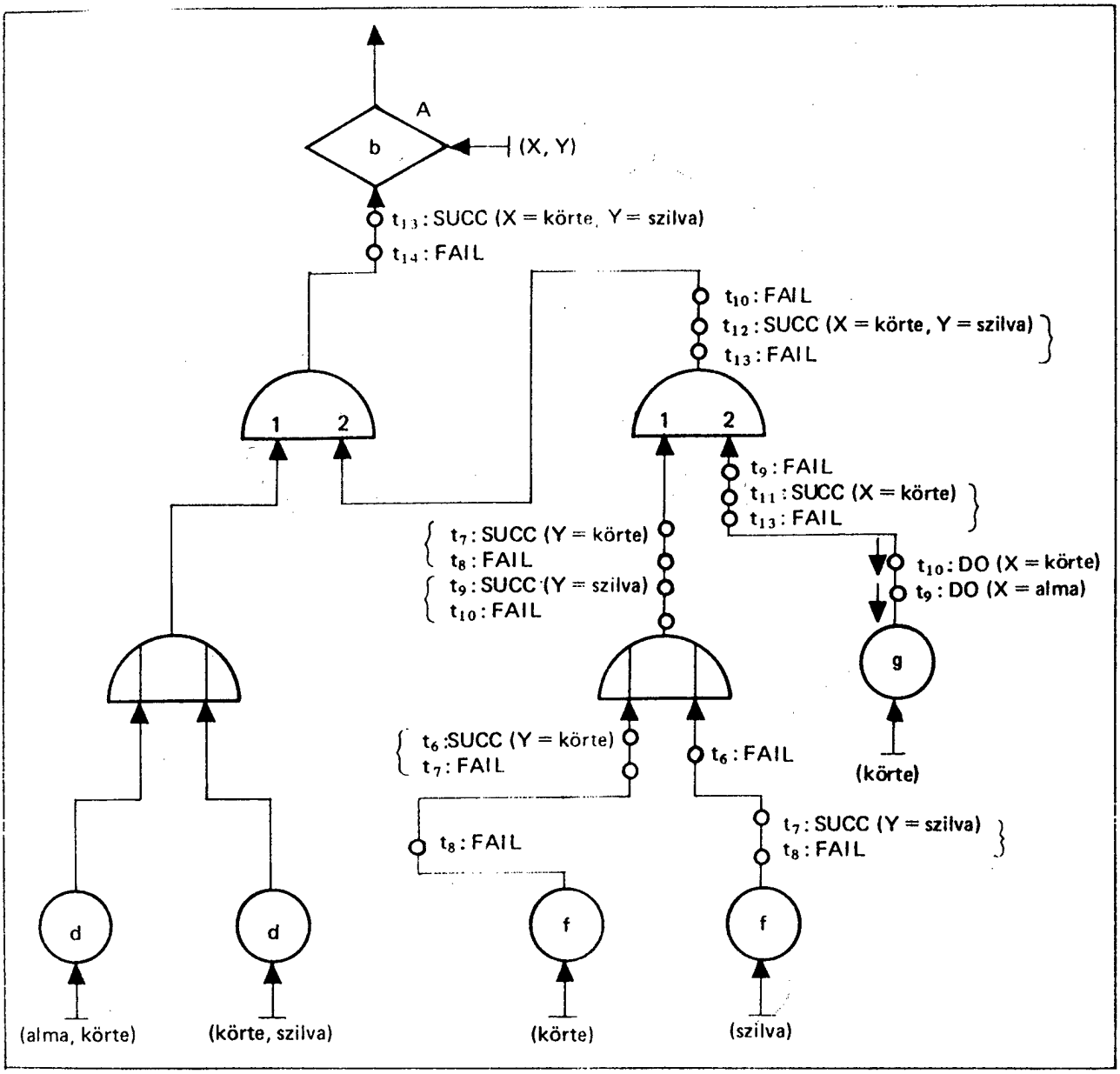
FIGURES



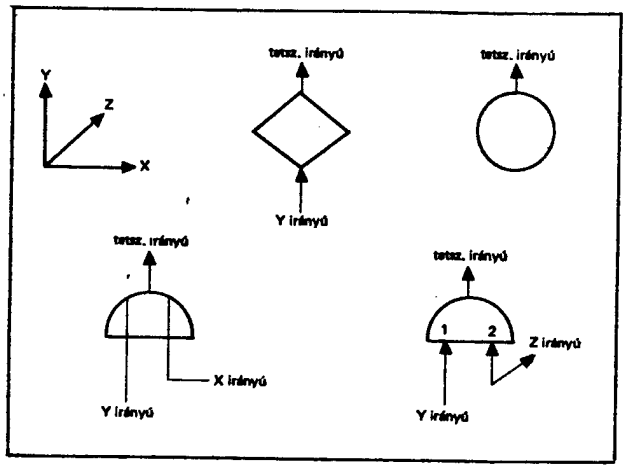
2. p 67. Data flow graph of the sample program.
[The Hungarian words are the variable values--"apple," "plum," etc.]



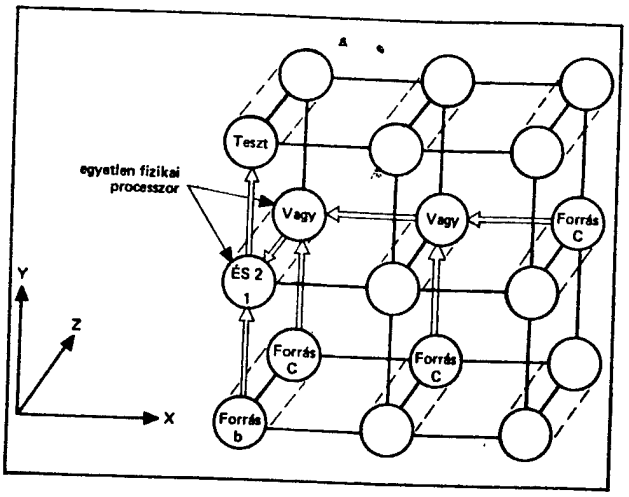
3. p 70. The dynamic behavior of the part of the graph belonging to the deduction rule b(X,Y)<d(X,Y)&f(Y)&g(X) at moments t1-t6.



4. p 71. The dynamic behavior of the part of the graph belonging to the deduction rule b(X,Y)<d(X,Y)&f(Y)&g(X) at moments t7-t14.



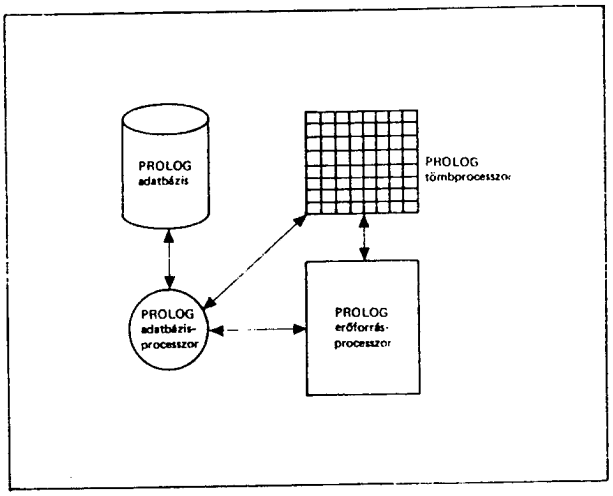
5. p 72. The three-dimensional directions of the arrows of the operators. ["Iranyu" means "direction"; "tetsz." means "optional."]



6. p 72. Mapping the program:

```
a(X,Y)<b(X,Y)&g(X)
b(apple,pear)<
c(grape)<
c(plum)<
c(berry)<
```

["Egyetlen fizikai processzor" means "a single physical processor"; "teszt" means "test"; "vagy" means "or"; "forras" means "source"; and "es" means "and".]



7. p 73. Structure of the PROLOG system.
["PROLOG adatbazis" means "PROLOG database,"; "PROLOG adatbazis processzor" means "PROLOG database processor"; PROLOG eroforras processzor" means "PROLOG resource processor"; and "PROLOG tombprocesszor" means "PROLOG array processor."]

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CSO: 2502/67

LOCAL NETWORKS USING PROPER-16 COMPUTERS

Budapest SZAMITASTECHNIKA in Hungarian No 6, Jun 86 p 7

[Article by Dr Ivan Solt: "Local Networks on Proper-16 Computers"]

[Text] Parallel with the development or rather sale of the professional personal computers of the SZKI [Computer Technology Coordination Institute] there began the development of suitable tools to link these machines into a high speed local net. The network type sold in the largest numbers thus far--PRONET--has the following chief technical characteristics: line arrangement (bus); 1 M byte/s data transmission speed; 1,200 meter bridgeable distance; linking via twisted pairs; logically 255 stations (computers) which can be connected to one another.

On the basis of network applications developed at the SCITEL it can be said that connecting the machines into a local network makes it possible to consider a number of factors which could not be considered earlier when designing personal computer systems, such as:

--the increase in processing capacity which can be attained with a local network makes possible the solution of tasks for which there was no possibility in this machine category earlier;

--systems more complex than earlier ones can be built up and put into operation in a more modular manner, making it possible to start up independent part systems in step with financial or applications possibilities;

--the capacity of the computer technology system connected into a local network can be divided up among the part systems, making possible better exploitation of the tools (background stores, printers, continuous operation magnetic tape drives--streamers, etc.);

--the parallel operation of part systems processing each others' data files is possible.

In addition to developing new applications the local network can be a useful tool for those user systems which have "outgrown" a given configuration. In a significant number of such cases an expansion can be realized on a

fundamentally unchanged technical base--by using network tools--instead of switching to a larger machine.

The figure shows a PRONET network made up of various types of Proper-16 computers.

These machines as local network tools are something new for users. Network sales of the devices began in December 1985. The local networks based on the Proper-16 which have been put into operation are being used to solve quite varied tasks, such as:

--for educational purposes; here the instructional materials in the machines connected through the net can be accessed and used from any machine;

--for business tasks of agricultural producing units; here the part tasks (general ledger, material records, etc.) run on different machines;

--for developmental tasks; in this application the developmental tools are placed in various network configurations; errors deriving from testing in the course of the development do not cause the entire multi-user system to "crash" but only cause the periodic falling out of the part system affected.

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SOCIAL RESEARCH DATA BASES DESCRIBED

Budapest SZAMITASTECHNIKA in Hungarian No 6, Jun 86 p 9

[Article by Tamas Csiffary: "Social Research Data Bases; A New Shop for Sociology--The TARKI"]

[Text] In the interest of a further development of an information base for and methodological coordination of social research a new service type shop or organization was created in January of last year, the Social Research Informatics Association (TARKI).

The association is open, any institution dealing with social research or using the results of it can join with the approval of the founding members (the Sociology Institute of the Lorand Eotvos Science University, the Central Statistics Office, the Social Sciences Institute of the MSZMP Central Committee, the Sociological Research Institute of the Hungarian Academy of Sciences and the Mass Media Research Center). (The Sociology Faculty of the Karl Marx Economic Science University and the National Pedagogic Institute recently joined.) Those joining must acept the goals of the association.

Tasks, Services

The TARKI regards as its task the uniform, highly processed central archiving of various types of sociological and social statistics data which can be used directly for the purposes of secondary analysis and the development and operation of a common data recording system which will make possible the inclusion of questionnaire blocks on behalf of the several research sites. They will offer coordinated methodological and computer technology development and consultation for the several institutions. They intend to improve the professional cooperation of the member institutions by handing over experiences, methods and not least of all software products.

TARKI offers a number of services to its nenbers--partly free of charge and partly at cost--and to outside commissioning organizations.

They hand over entire data groups according to the "Data Archiving Code", perform machine analysis of stored data and undertake data collection in an appropriate data recording system. Methodological advice and advice connected with software products are given free of charge to members of the association.

The preparation and dissemination of various publications (e.g., TARKI INFORMACIOK) is an important part of the services.

Data Bank

The data bank of TARKI--which contains archived data on approximately 76 research projects--stores in up-to-date form the data of sociological surveys worthy of secondary or comparative analysis.

The association is in direct, online contact with the IBM 3031 and CDC 3300 computers of MTA SZTAKI [Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences]. On the premises of TARKI one can find, in addition to the data stored on magnetic tape, all the documentation on the archived research, the questionnaires, the coding instructions and a general description of the study. The archiving of the information is done with the aid of the SPSS (Statistical Package for the Social Sciences) or the further developed version, the SPSS/X.

The fee to use the data bank varies between 2,000 and 5,000 forints per data file. A "Search System" has been prepared for the data bank to aid users. This makes possible search, selection and listing among research documentation, respondent names and data categories. The search program, which "communicates" with the user in the Hungarian language and requires no sort of computer knowledge, can be used free of charge on the Varyter machine of the TARKI.

By starting study courses and publishing TARKI INFORMACIOK the association is undertaking a large part in expanding the methodological information of social researchers and sociologists. The TARKI Club provides a forum every month for those interested in the methodological problems of social research. The association is a member of the IFDO and the International Organization of Social Science Data Banks. This makes it possible for TARKI to help users effectively even in questions connected with the international exchange of data.

The founders trust that the association will contribute to the development of domestic empirical social research. Simplifying and making economical the collection of new data it can ensure a better concentration than before on substantive elements of the research process, can contribute to the spread of a modern methodological culture and can expand the international outlook of social researchers.

But first of all TARKI is an opportunity. In the words of Tamas Kolosi, business director of the association, "It is an opportunity for the researchers, which will become a reality only to the extent that the researchers want to make use of the possibilities offered by TARKI."

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NEW FLOPPY DISK DATA STORE DEVELOPED

Budapest SZAMITASTECHNIKA in Hungarian No 6, Jun 86 p 14

[Text] A new type of floppy disk data store needed for computers has been developed in the Dunaujvaros factory of the Hungarian Optical Works. It can do twice as much as the old one but takes just half as much space, and it is interchangeable with the old one. Two new stores can be put in the place of one old and then the capacity is four times that of the former. The Dunaujvaros plant increases its production of stores by 40-50 percent each year; last year it produced 18,000 and this year it is producing 28,000. It supplies all domestic manufacturing firms and exports to every socialist country. Its largest customer is the Robotron firm in the GDR. Zero series manufacture of the new, larger capacity stores will begin at the beginning of the second half of the year.

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CAPABILITY OF SOVIET ES 1036 COMPUTER

Budapest SZAMITASTECHNIKA in Hungarian No 6, Jun 86 pp 2, 4

[Article by A. K.: "What is the ES 1036 Capable Of?"]

[Text] The continual growth of the inventory of Soviet computers beyond the borders of the Soviet Union is indicated well by the fact that the number of its universal ESZR [Uniform Computer Technology System] computer systems which can be found in 15 countries of the world exceeds 700. Five hundred of these were manufctured by the well known Minsk Computer Technology Association. At present 125 ESZR systems of Soviet manufacture operate in our country. Information concerning this, among other things, was provided by Boris Maleyev, representative of the Radio Industry Ministry of the Soviet Union, on the occasion of the transfer, in Budapest in March, of the first ES 1036 system in Hungary at the National Technical Information Center and Library (OMIKK). This computer counts as one of the first representatives of the third generation of the ESZR. In addition to the ES 1036, which counts as a medium category system in today's sense, the Minsk factory produces the ES 1061 (two million operations per second) and is now beginning series manufacture of the large ES 1066 system with a speed of five million operations per second.

A Modern Information Service

The Soviet machine put into operation in the technical library is also the first in the country from the viewpoint that its chief task is to process the professional literature; with the development of an experimental model system they will set up a national professional literature information system and provide the conditions for its operation.

The idea came up at the OMIKK of setting up two databases which could be accessed by both information institutions and users. One is called the online catalog; every foreign professional book, dissertation, standard, journal and the many other works on technical-scientific subjects coming into our country will be entered in this.

The other is the so-called "Hungarian language reference database" which will contain in the computer in accumulated form all those abridged reports which have appeared in recent years in the professional literature reviews. In addition one will find in the constantly growing database an indication of the

source work and a coded designation of the special area so--with computer assistance, thanks to the so-called text database management packages--it will be possible for interested experts to select the professional literature notes of interest to them, learn their content from the Hungarian language extracts and, in case of need, learn the location of the source document from the catalog database.

A Generation Change

The chief characteristics of the ES 1036 are shown by the comparison table.

Characteristic	ES 1035	ES 1036
Processing speed (1,000 operations/s)	175	400
Capacity of operational memory (M bytes) min./max.	1/3	2/4
Capacity of control store (K bytes)	48	128
Number of channels (max.)	5	5
Number/speed (K bytes/s) max. of SEL channels	3/740	--
Number/speed in MPX operation/ speed in monopole operation (K bytes/s) of BYMPX channels	1/40/280	1/50/320
Number/speed (K bytes/s) max. of BLMPX channels	1/740	4/1500
Circuit integration		
Central unit:	ECL 500	ECL 500 extended
Microprocessor	--	589, TTL Schottky
Operational memory	NMOS 4K	NMOS 16K
Number of cabinets (processor + max. operational memory)	3	2
Acoustic self diagnostics	no	yes
Operating system	OS/ES 6.1	SVM; OS/VS.1
Power requirement (kVA)	17	11.8

The ES 1036 system has about twice the speed compared to the earlier ES 1035 model. The hardware and software tools make it possible to use a 16 M byte virtual memory. The processor is microprogram controlled; a 128 K byte capacity, virtual organization, loadable microprogram control memory makes possible dynamic microprogramming. One can find an accelerating (cache) memory in the computer and there is an internal interface connection possibility for supplementary devices. The speed of data traffic with peripherals is about 10 M bytes per second. The automatic self-diagnosis unit which can be found in the computer is of great significance. Diagnostics at the microprogram level make possible operational tracking and checking of the operation of the hardware-software tools. A diagnostic stack memory is also an accessory of the system. It is a unique characteristic of the special, picture screen

operator's console that it operates as an independent special purpose microcomputer in a multifunctional mode.

The new system of the OMIKK consists of the central unit of the ES 1036, its operator's console, eight ES 5066M type 100 M byte disk drive units and certain units of their ES 1035 computer system which existed earlier. On the basis of this there is a prospect for signing a research and development contract with the OMFB [National Technical Development Committee] the object of which would be laying the foundations in a model system form for a national professional literature information system in the future.

Since operating it with a remote processing processor would make possible service on 20 telephone lines one can expect that the providing of information will accelerate by several orders of magnitude and it will be possible to realize the idea of the OMIKK experts according to which the unequal chances between provincial and Budapest experts dealing with the professional literature can be ended in this way.

The OMIKK and its chief authorities are calculating that in possession of the modern technology it will be possible to shorten the time needed to develop large national systems while the manufacturer and vendor are confident that they have found the most suitable reference site to lay the foundations for the domestic spread of the ES 1036.

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HUNGARIAN COMPUTERS COMPATIBLE WITH IBM PC/AT

Budapest SZAMITASTECHNIKA in Hungarian No 6, Jun 86 pp 7, 8

[Article by A. K.: "AT Compatible Computers"]

[Text] A number of high performance personal computers compatible with the IBM PC/AT have appeared in our country in the recent past. The series was opened by the MAT machine of the Instrument Technology Small Cooperative. As is well known the IBM PC/AT is a further developed, increased capacity version of the IBM PC/XT, most widespread around the world, which in many respects offers the user the possibilities of a minicomputer. It can be used as an independent machine, especially to run large database and spreadsheet programs, but its real capabilities can be exploited in multi-user systems, in the development of applications systems or in local networks.

Among the AT compatible machines which can be found in the domestic offering we have compared the MAT of the Instrument Technology Small Cooperative and the central computer of the mixed network multi-user system sold by Szamszov in table form according to their chief characteristics. We have also shown the corresponding parameters of the IBM PC/AT in the table.

The maximal storage capacity of the MAT, which is the same as the AT, can be achieved with only one expansion card instead of three. The capacity of the hard disk store is greater than that of the AT; the machine also handles 360 K byte floppy disks compatible with the PC/XT. The configuration of a machine with the price shown is: 512 K bytes RAM, monochrome screen, 1.2 M bytes floppy disk and 27 M bytes hard disk storage, keyboard, MS-DOS and a BASIC interpreter.

The central computer of the mixed network system of Szamszov is sold only together with the terminals providing multi-user operation. The price shown corresponds to this also.

Without an expansion card the memory can be increased to 1 M bytes, as with the AT or MAT machine. The maximum memory capacity can be 12 M bytes. The built-in hard disk store can have a maximum capacity of 105 M bytes. The number of keys is the same as with the AT and the MAT (84). Using the concurrent CP/M multi-user system and the supplementary Szamszov software one

can access the same data file from several terminals, opening them optionally for read or write. The price of the four terminal system includes an appropriate operating system and the BASIC interpreter.

The data shown come from the manufacturers or vendors and reflect the situation as of April 1986.

Manufacturer or Vendor Model	Instr. Tech. MAT	Szamszov*	IBM PC/AT
Processor	Intel 80286	Intel 80286	Intel 80286
Speed (MHz)	6.0	6.0	6.0
Coprocessor option	Intel 80287	Intel 80287	Intel 80287
Memory capacity (K bytes):	512	512	512
Max. (M bytes):	3	12	3
Floppy disk store (M bytes)	1.2	1.2	1.2
Hard disk store (M bytes)	27	20	20
Number of disk stores which can be connected (max.)	4	4 6	3 5
Number of expansion ports			
Screen size (inches)	12	14	12
Resolution--monochrome (pixels)	640 x 240	720 x 348	780 x 350
Resolution--color (pixels)	320 x 200 or 640 x 350	640 x 200	640 x 350
Operating systems	MS-DOS 3.11; concurrent DOS 4.1; Xenix compatible	MS-DOS 3.0 or 3.1; concurrent DOS 4.1; concurrent CP/M; Xenix compatible	PC-DOS 3.0; PC-DOS 3.1; IBM PC Xenix
Maximum number of work sites	5	5	3
Price (millions of forints)	1.18	2.08***	$6529**

* Central machine of the mixed network system of Szamszov.
** 512 K RAM, 1.2 M bytes floppy disk store, 20 M bytes hard disk store, monochrome screen, keyboard and printer.
*** Price of four terminal system.

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USER GRADING OF PROGRAMS DESCRIBED

Budapest SZAMITASTECHNIKA in Hungarian No 6, Jun 86 p 5

[Article by Lajos Jarabek: "User Classification of Program Products"]

[Text] The quality of products--thus of program products also--is determined by their operating mode, reliability, ease of use, simplicity and ability to be modified to environmental changes quickly and with little expense. In the final analysis these properties can be judged in a definite way only on the basis of an evaluation by the user in a real environment. The KSH [Central Statistics Office] is undertaking to do this as a first experiment, as an office responsible for the computer applications branch and as an organ independent of developers and users. How a future user will judge a product depends in large measure on what quality requirements the producers pose for the product in the course of its production, at the various stages of production, on how well these requirements correspond to the concrete needs of the user environment and on the way in which adherence to these requirements is checked.

The development of grading procedures and methods to be used in the course of producing program products is taking place throughout the world. They are beginning to develop the concrete characteristics determining quality, the parameters of them, ways of measuring the parameters and tools for automatic evaluation of them. In our country and in the CEMA countries the so-called developer grading of program products is still in a developmental phase. It can be expected that in 2-3 years we will have uniform methods and tools which will make possible the organization and operation of grading systems for various classes of program products at the development sites taking into consideration the requirements of various applications areas.

Until a developmental grading system is developed and parallel with this there is certainly a need for the organization and systematic use of grading based on user evaluations under real conditions. This is today the most widespread form of grading throughout the world and it is the form which can be realized with the least relative expense. The grading must be conducted by an organization independent of the developers and the users.

As a first step I propose that the grading be done on program products used in the professional microcomputers compatible with the IBM/PC which are most widespread in our country and that the grading be done in the following groupings: operating systems and supplements, languages, database management and information retrieval systems, method oriented systems, systems solving economic-organizational tasks, text editors and applications generators.

A possibility for evaluation will be given by obtaining the following types of information: the number and types of environments in which each product is used; the average satisfaction index for the given product, its developer and vendor; which are the most significant software development and vending institutions; what are the most widely used systems in the several categories; what is the average satisfaction index for the several development and vending organizations; and what is the average value of the several quality indexes for the products evaluated.

The quality indexes must be chosen in such a way that they reflect the positions of the users and that they can be evaluated on the basis of concrete applications experiences. Useful for the development of the evaluation system would be taking over the index and evaluation system developed and regularly used by DATAPRO, an American organization specializing in analysis and marketing of technical-economic information connected with computer technology. This system has the following quality characteristics: general satisfaction; simplicity of introduction; simplicity of use; quality of documentation; quality of the technical support of the developer and vendor; level of instruction connected with introduction; and success/efficiency.

The user evaluations which can be given for the several characteristics are: outstanding, good, average and weak.

It is necessary to include in the evaluation only those products which have several users.

Those products which are used in larger numbers and for which the average satisfaction index is high should be given some sort of moral recognition; for example, they might be put on a list of "program products of the year." Reports on the results of the evaluation should appear in various computer technology journals.

The proposed quality characteristics expressing user viewpoints appear subjective, but they have a close connection with quality factors described and recommended in presently known quality models taking as a basis the internal properties of program products and the technology of the developers.

By way of illustration let me say only that development level grading models use 11 quality factors, defining about 30 various quality parameters for quantitative evaluation of them. The metric needed to measure the parameters is in the R and D stage presently throughout the world. But intensive development work on this theme is going on even within CEMA. Noteworthy results have been achieved already in Hungary at the SZKI [Computer Technology Coordination Institute] and the SZAMALK [Computer Technology Applications Enterprise] (SOMIKA and Qualigraph).

One of the important tasks of the coming period will necessarily be determining factors and criteria for various classes of program products which are most characteristic from the viewpoint of applications, perfecting measurement methods and metrics for them and developing a system of tools for measurement. A similarly important task will be development of a system of standards pertaining to quality for the product groups.

On the basis of the above it can be seen that it is necessary to initiate in time a solution of basically two tasks in connection with grading--the organization and implementation of a user grading system and providing information in connection with this, and a determination of R and D themes providing conditions for developer grading, providing the material, objective and personnel conditions necessary to carry this out.

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MATHEMATICAL, DECISIONMAKING MODEL FOR INVENTORIES

Budapest SZAMITASTECHNIKA in Hungarian No 6, Jun 86 p 5

[Text] Workers at the Computer Technology and Automation Research Institute (SZTAKI) of the Hungarian Academy of Sciences have developed a family of mathematical models which could offer aid in continual material supply for production and in inventory management in any area of the people's economy. Computerized materials record keeping has been introduced already at numerous Hungarian enterprises, but this can only register the inventories of primary materials, semifinished products, finished products and parts. A computerized system based on the mathematical models developed at SZTAKI would be suitable for preparing decisions connected with material management as well.

For example, relying on appropriate data it could provide up-to-date information about what materials should be ordered, when and in what quantity, when the arrival of these materials could be expected and how demand for the products might develop. The family of models can also be used well as part of a production guidance system.

Indeed, it is even possible to show, in a "dialog" between the decision maker and the computer, what the most favorable solution is in a given situation.

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ADVANCED TRAINING IN INFORMATICS INTRODUCED

Budapest SZAMITASTECHNIKA in Hungarian No 6, Jun 86 p 14

[Text] Since September of last year the Mathematics and Computer Technology Institute of the Kalman Kando Electric Industry Technical College (KKVMF) has introduced further training for graduates in the new informatics special engineering section. There are five obligatory common subjects in a form of training suitable for evening instruction. It is also obligatory for students to take two subjects each from the three subject groups which can be chosen. One of the subject groups is industrial informatics (the subjects are: embedded microprocessor systems, CAD/CAM, programming industrial robots, and data transmission techniques). The chief goal of this group is to aid the realization of applications in an industrial environment and to develop further the knowledge of those participating in product development. The second subject group is enterprise informatics (designing, building and using information systems; data base management; and enterprise case studies). The third is so-called software technology (this includes software production, real time programming, data bases and simulation techniques). The four semesters of training, a total of 500 hours, ends with the writing of a thesis. The first postgraduate training started with 25 persons. The college is now planning to start day training in informatics--as an independent section.

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COMPUTER CENTER FOR MEDICAL RESEARCH, TRAINING

Budapest SZAMITASTECHNIKA in Hungarian No 6, Jun 86 p 8

[Article by Attila Sali: "Computer Center in the Service of Medical University Training-Therapy-Research Work"]

[Text] The computer center reorganized 4 years ago at the Semmelweis Medical Sciences University (SOTE) does useful work for the SOTE in four chief profiles with the introduction of computer technology instruction, with effective support of therapy work with computerized methods, by solving the mathematical-computer technology tasks of medical-biological research and by creating economic and professional data banks.

Beginning with school year 1986-87 the future physicians, dentists and pharmacists in the SOTE training system, preserving traditions and constantly renewed, will become acquainted with work done on computers.

The computerized training program worked out by our computer center and to be introduced at the largest medical sciences university of the country will aid the understanding and mastering of professional subjects and will prepare the students to use the computer technology and microelectronic systems which can be used in the practice of their profession. The instructors from the clinics and institutes prepared the medical models of the study materials for the experimental training and the workers of the computer center prepared the program packages based on them.

Program Packages For Study

Within the training program a better understanding of professional medical subjects is aided by, among other things, a program package simulating the operation of a computer tomograph, with graphic, three dimensional demonstrations.

At the common request of students and instructors training and testing programs were prepared to support preparation for examinations and for test type reports.

A "Diagnostic and Therapy Selection" program package is a modern tool for training for medical practice. It provides practice in making diagnoses and selecting the correct treatment procedure and simulates well the physician-patient link. Deviating from the logical system of textbooks and in accordance with actual medical practice the complaints of the patient, the tests which might be employed and the possible treatment procedures are listed on the screen of the computer. With continual responses from the "menu" offered by the computer the student comes to a recognition of the disease and a determination of the treatment. The computer evaluates the work of the student, warning if important tests are neglected, and records the mistakes made. The program package is truly "user friendly", playfully forcing the student to think, providing good help in acquiring therapy practice and eliminating the dangerous situations and stress effects of actual treatment. The program package will be used first in the teaching of internal medicine for fourth and fifth year students.

Systems Aiding Therapy

Various work groups of national institutes and university clinics in our country are dealing with treatment and care of those suffering chronic illnesses and parallel with this with clinical research pertaining to the given diseases.

We have prepared "flow up" systems, data banks on these diseases, for medical groups dealing with high blood pressure, kidney and heart disease. This system, based on a microcomputer and a large computer, makes possible the introduction of uniform testing procedures, concepts and documention; it handles the assignment of patients and sends a warning if a patient is missing treatment and aids the work of the treating physician with tabular and textual summaries stressing pathological deviations.

With the aid of the "operated heart patients" data bank of the National Cardiological Institute it was possible to analyze the effectiveness of heart operations and made it possible to determine the optimal time for an operation by comparing the condition of the patient before and after the operation.

A data bank on "kidney transplant patients" records medical information and donor-recipient records on the kidney transplants regularly performed at Surgery Clinic No I. Similarly important medical goals are served by the "operated angiology patients" data bank of Surgery Clinic No II, the "operated thyroid patients" data bank of Surgery Clinic No I and the "high blood pressure patients" data bank of Internal Medicine Clinic No II.

Therapy work is supported by microcomputer laboratory evaluation systems which accept the orders for medical tests, schedule the lab work and print out the findings.

From the viewpoint of medical-mathematical modeling and use of the computer as a direct treatment device the most interesting task and one still strongly debated today is the creation of expert systems. The conversational microcomputer program packages "dosage of antibiotics in the event of reduced

kidney function" and "optimal artificial kidney treatment planning" can be built directly into the treatment process as the first expert systems of the SOTE.

A clinical patient admissions system reduces the administrative activity of physicians and assistants and aids better patient service and more reliable documentation of treatment activity. It prepares on a microcomputer the daily personnel report, the house book, record of empty beds by ward, patient lists by department, radiological, histological and lab test tickets, and patient turnover in the intensive care department. The system contains different collections of data by professional profiles for the purpose of preparing year-end statistics.

Support of Research Work

Each year the computer center participates in an average of 30-40 research tasks with computerized evaluations and by preparing mathematical models. Let us mention three characteristic types of task to illustrate the significance, complexity and manifold nature of the theme.

By determining with discriminance analysis the disease causing "weight" of risk factors--e.g. smoking, weight, blood pressure, etc.--predisposing heart and lung disease we developed screening systems on a computer which can classify the people tested on the basis of the data measured into healthy and sick or strongly endangered groups with great probability. This method can significantly aid the economical and effective preventive screening of the populace.

The development of partition models and determining the rate constants of the differential equations produced on the basis of the measured concentration changes in the partitions--which simulate human organs--is of crucial significance in studying the effect of medicines. This method is a direct use of the results of systems theory in pharmaceutical research.

The digitization and evaluation with mathematical-statistical methods of the EEG signals obtained during brain studies and the EKG signals recorded during heart studies constitute a special chapter in medical research.

Leadership Service Tasks

The direct, computerized support given to the leadership of the university is an especially important task for us. For the purpose of more rational and thrifty use of intellectual and material resources we developed a "labor affairs and wage accounting" and a "fixed assets and inventory management" system for the SOTE, providing up-to-date records and ensuring the swift execution of data bank querying needed to prepare decisions. In accordance with the needs of the cultural and medical branch leadership we also solved full scale computerized evaluation of data on those applying for admission, all the way to assigning students admitted to study groups.

The tasks are known for the long term, they are beautiful and are useful for the entire university. The intellectual capacity to solve them is available and it is to be hoped that with the planned computer acquisitions the outmoded computer inventory of the SOTE will be renewed and will be able to keep up with the accelerated domestic computer technology development.

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COUNCIL INFORMATION SYSTEM FOR BETTER ADMINISTRATION

Budapest SZAMITASTECHNIKA in Hungarian No 6, Jun 86 p 1

[Article by A. K.: "Council Informatics; For More Modern Administration"]

[Text] In the course of realizing the program titled "Council Administration Informatics Model Systems" they have begun to develop applications systems based on uniform principles which can be extended nationally for all council administration. In the course of this the goal is introduction of systems which can be set up at the so-called work sites. One can also sense from the council reports that today there is already an increasing demand for applications systems based on computers.

The Role of the ASZI

The Council Computer Technology Days exhibit held in April under the auspices of the State Administrative Organization Institute (ASZI) faithfully reflected the conclusion of an experimental period and a turning point which defines in council informatics the important administrative developments in the Seventh 5-Year Plan period. The three day event was intended primarily to call the attention of the executive committee secretaries of city and county councils to the results achieved and the new possibilities.

Under the guidance of the ASZI 18 program systems and four data management systems have been prepared or are nearing completion. The exhibit also offered a good occasion to begin a wider spread of these products.

"The basic question is that we should provide the councils with turnkey systems," said Dr Jozsef Zeisler, deputy director of the ASZI. "In the course of the task of disseminating them (instruction, consultation, service, supplying consumables, etc.) we have need of a disseminating organization. I am thinking in a broad sense of an association which will embrace such activity by the ASZI, the supplying enterprises (e.g., SZAMALK [Computer Technology Applications Enterprise]), the interested small undertakings and the councils themselves."

Exhibit in Budaors

At the exhibit held in the Budaors culture house 12 enterprises and institutions displayed computers and other informatics equipment and applications program systems which will aid and modernize council administrative work. The exhibit of SZAMALK called attention to larger computer systems which retain the applications advantages of small work-site systems but also indicate the direction to be followed in the future. The SM-1420 system equipped with 2 M bytes of operational memory, 160 M byte Winchester disk and 80 M byte exchangeable magnetic disk stores, a very reliable fast magnetic tape unit and five picture screen terminals (DEC) operating as perfect VT-100's (in the configuration exhibited) is a unique product in the offerings of domestic minicomputers. The devices connected to the system at the exhibit included Rolitron text editing equipment, a C-64 operating as a VT-52 terminal and a new product, the VPC II professional personal computer (640 K bytes RAM, 360 K bytes floppy disk and 20 M bytes hard disk stores, MS-DOS 3.11), a product of Victor compatible with the IBM PC/XT. They ran on the system a program system of the Bacs-Kiskun County Council supporting council planning work. The INTERCALC spreadsheet program developed by SZAMALK and exhibited within the framework of the council computer technology days can be used on SM-4 and SM-1420 computers and on IBM, ESZR [Uniform Computer Technology System] and Siemens computer systems but it also can be adapted quickly and cheaply to other machine types (e.g., the IBM PC/XT). It has a work area of 254 lines by 64 columns.

A demonstration of the status and future of council information systems was also an important element of the exhibit. According to the ideas it will be necessary to develop information systems which the client can use without having to go into the council; for example, one could get information with the aid of querying equipment located at well trafficked spots. Where there is cable TV one could establish a local illustrated newspaper for the broad dissemination of council information.

Because of the interest shown in the programs already developed and the expected spread of the new systems exhibited we can hope that, in addition to a broad use of computer technology at the work site level, computer applications systems will appear in the near future at the level of special administrative organs and council leadership as well.

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FOREIGN ECONOMICS MULTILINGUAL THESAURUS PUBLISHED

Budapest SZAMITASTECHNIKA in Hungarian No 6, Jun 86 p 8

[Article by Gyorgy Viszkei: "Publication Lays Foundation for Computerized Foreign Economics Information System"]

[Text] The "Magyar Kulgazdasagi Tezaurusz" [Hungarian Foreign Economics Thesaurus] was recently published as a result of several years of preparatory and editing work. It is aimed at development of an information service for foreign economic activity, at improving the surveyability of processes and at making people acquainted with the terminology and system of contacts for this activity in a comprehensive way, but one which does not neglect details either. The Hungarian Chamber of Commerce initiated the creation of the publication.

The first thematic part of the publication, of nearly 900 pages, contains in 39 chapters the general and special concepts used in foreign economics, a description of all the activities involved (e.g., foreign trade, its financial aspect, the bank, shipping, insurance, the carrying trade, fairs and exhibits, marketing, customs, etc.), the pertinent organizations and a technical system for what should be known about foreign economics. Of the 39 chapters of the thematic part special mention should be made of chapters 03. Informatics, 18. Foreign Trade Data and 36. Computer Technology which, supplemented by the other chapters, can serve as a uniform base for the development of a modern, computerized information service.

The thematic part provides a review of the concepts occuring, with a graphic representation of the system of contacts among them, the necessary explanations, supplementary notes and the designation in the four most important foreign languages, in addition to Hungarian, of the several concepts (descriptors) and their synonyms.

The second alphabetical part is a five language alphabetical list of the expressions used in the first thematic part, so it is a technical dictionary, with references to the place they occur in the thematic part and to their role in the system of contacts.

In this way the two parts fulfil the function of foreign economics lexicon and technical dictionary, thus providing an information base for practical orientation which did not exist before. The quality of the publication in its own areas is outstanding as was ensured by the cooperation of about 50 authors. Experts from the Karl Marx Economic Science University and the Foreign Trade College and workers from the National Plan Office, the Ministry of Finance, the Ministry of Foreign Trade, the Central Statistics Office and other national authorities responsible for or cooperating in its creation reviewed the material prior to publication. The work, published under the auspices of the Economics and Legal Book Publishers, can be obtained at the Istvan Szechenyi Book and Catalog Shop, No 4 St. Istvan Square, Budapest V.

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REPORTAGE OF FIRE AT MICROELECTRONICS ENTERPRISE

1 Billion Forints in Damages Estimated

Budapest NEPSZAVA in Hungarian 27 May 86 p 16

[Article by Jeno Toth: "Fire Devastates Microelectronics Enterprise; Press Conference at the Site; Damage About One Billion Forints"]

[Text] At 5:55 Monday morning, under circumstances as yet unknown, a fire broke out at the Ujpest site of the Microelectronics Enterprise, in manufacturing hall "T". Because of the cables, plastic equipment and various chemical materials in the 2,000 square meter hall containing valuable technological equipment the fire spread quickly and the smoke covered a significant part of Ujpest and Bekasmegyer and could be seen well even from Rakospalota.

In the interest of providing swift and precise information Dr Sandor Bognar, deputy minister of industry, and Dr Bela Balogh, director general of the Microelectronics Enterprise, received journalists at the site at five o'clock Monday afternoon.

As the deputy minister said, the fire department was informed of the event at 6:04 and its first units were on the scene in 8 minutes. Within a short time 143 fire fighters and about 30 fire trucks joined in the rescue and succeeded in extinguishing the fire in the forenoon hours. According to first estimates the damage is about one billion forints. While the fire was being put out 10 fire fighters and four factory workers were hurt or suffered smoke poisoning. Two of the injured had to be operated on because glass fragments had wounded nerves in the hand; the others were injured only slightly.

Since they manufactured semiconductor parts in the factory hall the lost production due to the serious damage to the equipment could have an effect on the enterprises which use them. For this reason the Ministry of Industry has set up a committee which has the task of organizing parts replacement so that the least damage will be done to the people's economy, and also of providing work for the some 60 workers affected. On Monday already several sister enterprises had offered to employ workers left without work because of the fire.

The personal belongings of a number of enterprise workers burned up in the fire; they received 500 forints emergency aid and full compensation has begun.

The deputy minister said that it filled the residents of the area with alarm because the cables, plastics and chemical materials flooded the area with strong smoke. For this reason the contamination of the air was measured at a number of places, but materials harmful to health did not get into the air in dangerous concentrations.

Monday morning a report spread like wildfire among the crowds watching the work of the fire fighters: The modern hall was fitted with automatic fire fighting equipment which would flood the rooms with foam in the event of a fire. But this equipment did not operate now because there was a fire at Christmas time, the automatic equipment put out the fire, but its containers had not been refilled since, or new tanks had been obtained but not installed.

At the request of NEPSZAVA, to put an end to the rumor, the director general said that there really was such a fire protection system in the hall but it put out fires not with foam but rather with gas (halon). There really was a fire earlier, but not in this hall, but the smoke coming in the windows set off the automatic fire extinguishers and the tanks really were exhausted. More than this cannot be said at the moment because a basic investigation is needed for that, but it is presumed that the automatic fire extinguishing equipment did not operate now.

The investigation is continuing. At the time of the press conference the fire fighters and experts from the factory were already investigating inside the hall.

Fire at Foti Street

Budapest ESTI HIRLAP in Hungarian 26 May 86 pp 1, 8

[Text] A few minutes after six o'clock this morning a very extensive fire broke out for causes thus far unknown at the site of the Microelectronics Enterprise bounded by Foti Street and Baross Street in District IV. Our reporter Peter Bencze-Szabo sent his reports from the scene until the paper closed.

Seven o'clock: Foti Street has been closed off, traffic is being diverted--to make a clear path for ambulance personnel and fire fighters. No one yet knows about personal injuries. The flames are endangering a neighoring office building.

7:30: The workers of the factory are saving what can be saved on the other front of the hall, on the Reviczky Street side. They are handing flasks, bottles and pieces of equipment out through the windows. Sooty, foamy water runs in the streets. It is reported that there are tanks inside which could explode. The fire fighters are extinguishing the flames with great strength.

Eight o'clock: The smoke is boiling around. If it is gray that is all right, the fire fighters say. But for minutes at a time blackness is mixed into the smoke.

8:30: The wind is shifting, bringing down black smoke which one cannot see through; at the Baross Street front of the hall one cannot see half a meter. They are asking on the radio for milk for the fire fighters--they say it is good against smoke poisoning. The line of little flasks, plastic containers and metal cans is growing on the Reviczky Street side. Those who can are saving what is valuable.

"What is burning inside?" someone asks.

"Everything," says a fire fighter in an out-of-breath voice.

Minister of Industry Laszlo Kapolyi has just arrived on the scene. Sirens can be heard in the distance, they are bringing replacements, extinguisher material. Dozens of ambulances wait as close as possible; fortunately they have had nothing to do so far--outside of a minor injury.

9:30: The roof structure of the factory hall has broken in at a number of places; the fire still rages everywhere. They are trying to put it out from above. Unfortunately there are injuries. First lieutenant and fire chief Gyula Csicsman sits in an ambulance with a bleeding hand. When they saw his wound they would have started back. The ambulance physician does not permit it. Two fire fighters support a third; his face is gray, he has inhaled a lot of smoke. A number of day off fire fighters, informed of the events, have reported to the scene and are working as if they were on duty. It is impossible to list their names, more than 100 fire fighters are fighting the flames heroically.

Ten o'clock: The smoke cloud above Ujpest is slowly dispersing. The fire fighters have localized the flames which have been raging for almost 4 hours and have cut off their route. One sees that the office building right next to the factory hall manufacturing semiconductors was in danger; the wall is burned black right up to the top level, the windows exploded from the horrible heat. They feared an explosion in the factory hall too, very dangerous tanks are stored in there.

The fire fighters are working in a glowing labyrinth of innumerable small chambers, moving forward virtually millimeter by millimeter. It appears that the rescue is slowly ending, but who knows how long the after operation work will last, putting a stop to the smaller flames springing up here and there.

They are studying the cause of the outbreak of the fire by bringing in experts at the same time the fire is being put out.

Cause of Fire Investigated

Budapest NEPSZABADSAG in Hungarian 28 May 86 p 5

[Unsigned article: "Uniting for the Electronics Factory; Press Conference About Ujpest Fire; Investigating the Causes"]

[Text] Restoration work has been going on night and day without stop since the fire on Monday at Building "T", which manufactured semiconductors, of the Ujpest factory of the Microelectronics Enterprise.

Deputy minister of industry Sandor Bognar, who has directed at the scene the work of the operational committee called on to establish what has to be done immediately, informed journalists on Tuesday that the Ministry of Industry, in conjunction with the National Materials and Price Office, the Ministry of Foreign Trade and Elektromodul, is jointly determining what must be done to compensate for the lost production. The goal is that continual work in the other units of the MEV should not be hindered by a shortage of parts, and what has happened should not mean any sort of disadvantage for enterprises using the products of the MEV, among these the most significant are Orion, Videoton, the BRG [Budapest Radio Technology Factory], the BHG [Beloiannisz Communications Engineering Factory] and the Terta firm.

Using an accelerated procedure the import permits will be issued this week at the Ministry of Foreign Trade to obtain the necessary import materials, and Elektromodul has been entrusted with coordination of the work among enterprises. Surveying the needs is taking place now and parallel with this the Ministry of Industry has turned for aid to a number of socialist countries also, which have the tools and materials now most important for the enterprise.

A committee has been formed, bringing in the appropriate people from the Ministry of Internal Affairs and the Ministry of Industry, to establish the cause of the fire which caused one billion forints damage, but for the time being there is no way to carry out a minute investigation for safety reasons. In the 24 hours since the fire structural engineers have studied the site so they can designate those paths along which one can move safely. Roof beams and side walls weakened as a result of the powerful fire and the work of putting it out threaten to fall in and in order to avoid further trouble all the building elements had to be studied.

A chemical analysis and chemical decontamination team of the Hungarian People's Army also offered aid; yesterday morning they began examining and removing the containers of chemical materials used to manufacture semiconductors.

As Sandor Bognar said, since a number of the tanks storing various chemical materials were damaged as a result of the fire and they began to leak gases produced when the chemical materials burned they brought the National Civil Defense Command and the KOJAL [Public Health and Epidemiology] into the operations also. The experts made measurements during the day Monday and every

hour during the night up to Tuesday morning but they did not find chemical contamination dangerous to health in the air or in the sewers.

Factory Fire, Substantial Damage

Budapest MAGYAR HIRLAP in Hungarian 27 May 86 pp 1, 7

[MTI Report: "Fire in Element Factory; Two Seriously Injured; Significant Material Damage"]

[Text] A fire broke out in the early morning hours yesterday at one of the factory halls of the Microelectronics Enterprise on Foti Street in Budapest. Fourteen people were injured while the fire was being put out, ten of them fire fighters and four workers of the enterprise. Two of the injured taken to the hospital are in more serious condition; they had to have minor operations, being injured by glass fragments while fighting the fire.

Sandor Bognar, deputy minister of industry, and the leaders of the enterprise held a press conference in the afternoon hours. He said that according to present estimates the damage could be put at one billion forints. Two machine lines in the 2,000 square meter steel framed hall were virtually destroyed; they manufactured the so-called chips needed for semiconductors. The fire also threatened a neighboring building but the fire fighters succeeded in preventing the further spread of the flames. For the time being the cause of the fire is not known; the origin of the fire can be established only after a thorough investigation. (Experts could enter the hall only in the late afternoon hours in order to make an investigation.)

The deputy minister emphasized that in the present situation the goal is to see that the damage caused by the fire affects as little as possible the people's economy, more directly the Hungarian electronics industry. The Ministry of Industry has created an operational committee which is working out measures to ease the situation, surveying how the parts absolutely needed by the electronics industry can be replaced and taking care that the lost production should affect other enterprises as little as possible.

Bela Balogh, director general of the enterprise, said that they had taken care of those workers who lost their jobs because of the fire. A number of partner firms have already offered them suitable work.

[Article by A. V.: "Fire in the Element Factory"]

[Text] Yesterday morning one or two minutes after six o'clock a great fire broke out--for reasons as yet unknown--in the Ujpest element factory of the Microelectronics Enterprise, in the area bounded by Foti Street and Baross Street. The lightly framed structure burst into flame in moments--in the opinion of eye witnesses--and as Dr Bela Balogh, director general, said, the fire department was notified immediately, and more than 100 fire fighters extinguished the flames within about 2 hours. The workers of the factory immediately began to move to safety things of value which could still be saved. The wind pushed the smoke cloud over the city like an impenetrable

black curtain. Minister of Industry Laszlo Kapolyi arrived on the scene between eight and nine o'clock.

After the flames were extinguished Fire Department Colonel Ivan Bartha gave a brief report. He said that a tense battle had been waged and that at the moment--Monday at eleven o'clock--Fire Department First Lieutenant Robert Romanek was directing those who were performing the after operation work. Yesterday about twelve o'clock Robert Romarek reported that at that very moment a tank containing dangerous gas had been rendered harmless but that there might be more such within the building.

Dr Pal Sulya, ambulance chief physician, reported that ten fire fighters had been taken to the hospital, and he immediately added, with minor injuries. Three of the fire fighters went to the toxicology department where they were kept under observation for at least 8 hours while they cleared up what sort of gas might have caused the poisoning. Some had to be taken to the hospital with pulled muscles and others with hand injuries.

The director general of the factory answered our question, How great is the material damage?, with one word: Significant.

Lieutenant Colonel Dr Frigyes Kertesz, chief physician of the toxicology department of the Army Hospital, provided the following information: "Three fire fighters were brought to our department, not one of them is in a life endangering condition, but for the sake of safety they remain for further observation." At the ambulance hospital chief physician Dr Gyula Laszlo said that one fire fighter had been taken there; he suffered a hand injury. The condition of their patient is not at all serious and it appears that he may soon leave the hospital.

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MINISTRY OFFICIAL INTERVIEWED ON WHAT MEV FIRE LEFT INTACT

Budapest IMPULZUS in Hungarian No 14, 12 Jul 86 pp 10-11

[Interview with Peter Reiniger, main department chief in Ministry of Industry, by Judit Redei: "The Fire Did Not Hurt The Conception"]

[Text] We do not intend to describe the magnitude of the catastrophe here. Nor do we undertake to cast light on the causes. Rather, we asked Peter Reiniger, chief of the technical development main department of the Ministry of Industry, what remains, in connection with the MEV [Microelectronics Enterprise] fire, and how do we proceed.

[Answer] The first thing I would like to definitely emphasize is that we will try to collect the "crumbs" remaining in the spirit of the Central Economic Development Program for Electronic Parts--these crumbs represent no small capital--and help the domestic users, primarily, through the critical situation. The enterprises have already received emergency aid with extraordinary import possibilities. Only finished parts represent an immediate solution because bringing the remaining manufacturing base back to life will require time.

[Question] What can be saved?

[Answer] Design and mask manufacture remained physically intact at Foti Street. But the infrastructure for this is tied to that of the element factory which burned down, it will require 2-3 months to get work started again.

Assembly, encapsulation and testing are done at Gyongyos. The next step is to ensure continual production there. Talks are going on intensively in the interest of purchasing fully processed silicon wafers. We can be sure that the people in Gyongyos will not remain without work.

The remaining design and mask manufacturing capacity is very valuable. We certainly intend to make use of this; we are seeking cooperation possibilities with other countries, in deals where we design and make the masks and the partner would produce the finished wafers. Soviet, Czechoslovak, GDR and western partners are interested, because design and masking are bottlenecks everywhere.

[Question] And the domestic possibilities?

[Answer] The KFKI [Central Physics Research Institute] has very valuable intellectual capacity. Unfortunately its manufacturing possibilities do not even approach in volume those of which burned down. On the MEV line they produced 120,000 wafers per year; the KFKI can produce 1-2 percent of this with its available tools.

The circuits which can be produced in the microelectronics plant of the Communications Engineering Cooperative are not the same, in quanitity or in type, with the MEV circuits. At this plant they manufacture, practically 95 percent, special circuits, the so-called gate arrays, from wafers purchased in finished form. After certain design changes these could substitute for but not take the place of the MEV parts.

[Question] What sort of plans do you have for the MEV experimental manufacturing line?

[Answer] This remained intact, but at a few points it depended on the main manufacturing line. If it is to operate independently we must obtain supplementary equipment. The plans are ready; with some modification the G5 microelectronic parts OKKFT [National Medium Range Research and Development Plan] development program is applicable; a reconstruction of experimental manufacture figured in the ideas of this. Production on the line, with a capacity of 20,000 wafers per year, must start in a relatively short time.

[Question] And what will happen with microelectronic element manufacture?

[Answer] Naturally we will not give it up, because this would be giving up the entire electronic parts program. And as I said already, the basic ideas are still valid unchanged.

The next step, in the near future, is creation of a joint Soviet-Hungarian microelectronics enterprise in Hungary. The talks between the MEV and the Soviet side are almost completed. The Soviet colleagues support in a far-reaching way the idea that this must be done as soon as possible. In addition we have begun to work out plans for a new microelectronics factory. Even originally, in the Seventh 5-Year Plan of the Electronic Parts Central Development Program, there figured a reconstruction of assembly and encapsulation and development of designing and mask manufacture in the first phase. The user needs, the technical conception and the method of realization are known already; but now the question to be decided is where and in what sort of arrangement the factory to be established should operate.

[Question] I would like to ask here a question which does not seem to be related. Will the opposition between the equipment manufacturers and the parts manufacturers be resolved once and for all?

[Answer] This is the point where there certainly must be something new. Creation of the new plant certainly cannot be regarded as the business of the electronic parts industry alone. We must bring the interests of the parts manufacturers, the vendors and the equipment manufacturers into harmony. We

are seeking a form of cooperation--whether it be an association, a deposit association or a shares company--in which the equipment manufacturers presenting a definite need will have contact with the parts manufacturers at the same level.

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CENTRAL PHYSICS RESEARCH INSTITUTE OFFERS AID IN IC PRODUCTION

Budapest IMPULZUS in Hungarian No 14, 12 Jul 86 p 11

[Article by J. G. M.: "The Tools Put A Limit"]

[Text] Two days after the accident, the MEV [Microelectronics Enterprise] fire, the committee appointed by the Ministry of Industry--bringing in the involved authorities--was working on the necessary measures. Even though those "close to the fire" did not yet know how much damage the fire had caused and what sort of problems the unexpectedly lost production would cause (or had caused) to the enterprises using the products of the MEV, such as the Gyongyos Semiconductor and Machine Factory and the MOM [Hungarian Optical Works].

In the meantime the people from the army, the fire department and KOJAL [Public Health and Epidemiology] "interrogate" the remnants of the hall and in the office of the director general of the MEV the telephone calls come in one after another--plants, enterprises and research institutes offering their aid.

"In a letter on 29 May we informed the leaders of the MEV what work we could undertake in the interest of making up the production lost due to the fire," said Emil Kren, deputy director-in-chief of the KFKI [Central Physics Research Institute]. "Primarily we undertook to 'manufacture' those product groups which we could make on our equipment."

"As I understand it you offered your aid primarily in the category of chips which cannot be obtained on the market."

"That is right. The MEAT [Microelectronic Parts Association]--the Communications Engineering Cooperative and the Central Phyisics Research Institute--has a manufacturing capacity for OEM circuits. So we could undertake production of the MOS gate array products (UA-400, GA 800, etc.). Naturally it must be remembered that our institute has the productive capacity needed to manufacture chips on a laboratory scale, which puts a limit quantitatively to our ability to help. The technological laboratory of the KFKI is suitable for production of sensor chips--we could make light elements and photo transistors, heat and pressure measuring elements--such work is going on in our institute even now."

"What do you mean by a quantitative limit?"

"The wafer technology capacity which could be made available to help the MEV is at most 1,000 two or three inch wafers per year."

"It is reported that you also offered to employ a few of the workers."

"About 25 of the MEV workers could work in our shops on the microelectronic programs. The leaders of the MEV received our offer with thanks, but so far they have not told us whether they will make use of our employment possibilties."

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THICK FIIM IC TECHNOLOGY IN PRODUCTION OF SOLID STATE RELAYS

Budapest FINOMMECHANIKA, MIKROTECHNIKA in Hungarian No 1, Jan 86 pp 8-14

[Article by lecturers Dr Gabor Ripka, and Andras Schon, and assistant professor Dr Gabor Harsanyi: "Electronic (SSR) Relays Produced with Thick Film Integrated Circuit Technology." The first paragraph is the Hungarian language summary.]

[Excerpts] The article describes the concept of electronic SSR relays (Solid State Relays), the basic types of them and their operation and then outlines the developmental trends in SSR relays. It discusses the structure, operation and chief technical data of DC/DC and DC/AC type relays realized at the Electronics Technology Faculty of the Budapest Technical University (BME) with a thick film integrated circuit technology.

7. The Types Developed by the BME Electronics Technology Faculty

A number of SSR types were developed at the faculty; of these we will describe two characteristic examples below, a DC-DC type and a DC-AC type.

We realized all the types with a thick film hybrid circuit technology. The resistors and conducting layers were developed on a 95 percent Al_2O_3 carrier with screen printing, then burning in at 850 degrees Celsius. The condensers and the active elements were mounted in the proper positions subsequently as hybrid elements. We then encapsulated the circuits in epoxy cast plastic. The hybrid circuit technology and the silicon based semiconductor devices used gave great reliability and a long life expectancy to the SSR relays.

An optocoupler provides galvanic isolation between the input and output for both SSR relays.

The circuit diagram for the DC-DC SSR relay can be seen in Figure 10.

The R_1 resistor which can be found at the input limits the current of the LED diode of the optocoupler, while the D_1 diode offers protection against a reversed polarity input signal.

The T_1 transistor at the output drives the T_2 switching transistor. The D_2 diode clips the transients arising with inductive loads.

If we connect a control voltage to the input then the LED diode of the optocoupler begins to glow and the phototransistor begins to conduct.

The conducting phototransistor saturates the T_2 switching transistor through the T_1 transistor. When the control voltage ceases at the input the T_2 transistor switches off also and current does not flow on the load.

In the case of the DC-AC SSR relay also an optocoupler isolates the input from the output. The circuit also contains a zero transmission logic, which reduces to a minimum the interference voltage arising when switched on.

The circuit diagram of this circuit can be seen in Figure 11.

The R_1 resistor which can be found at the input limits the current of the LED diode of the optocoupler while the D_1 diode provides protection against a reversed polarity input signal. If there is no control voltage at the input then the T_1 transistor always shortcircuits the primer electrode of the T_h thyristor, excepting the environment of a zero transmission. The switch-on voltage can be set with the R_3 and R_4 resistors.

The D_2 diode provides the bias voltage for the primer electrode in the reverse direction, thus increasing interference protection.

The D_3-D_6 diode bridge provides the supply voltage for the control cycle and the synchronization voltage.

The R_8 resistor parallel with the triac and the C_2 condenser protect the triac against transients.

Let us look at the operation of the circuit if there is no control voltage at the input. In this case the phototransistor of the optocoupler remains closed. The increasing network voltage opens the T_1 transistor through the R_4 resistor. The transistor, being saturated, shortcircuits the primer electrode of the T_i thyristor, so it does not switch on, and the triac also remains closed. Only a small leakage current flows on the load.

If we connect the control voltage to the input in the environment of a zero transmission of the network voltage then the phototransistor of the optocoupler begins to conduct. The phototransistor shortcircuits the base of the T_1 transistor, the transistor does not open up, and the thyristor fires through the R_5 resistor. The conducting thyristor switches on the triac, and current flows on the load.

In the case where the value of the network voltage is already greater than the threshold voltage it is in vain to connect the control voltage to the input, the SSR will remain closed until the next zero transmission.

Then, although the phototransistor of the optocoupler is conducting, the base voltage of the T_1 transistor is so great that it saturates the transistor. The

conducting transistor shortcircuits the primer electrode of the thyristor, so the triac cannot switch on either.

The capsule design of the SSR relays can be seen in figures 10-11 and the hybrid circuit topology of the thick film can be seen in figures 12-13.

The chief electric parameters are as follows:

	DC/DC Type	DC/AC Type
Control voltage	3-8 V	3-8 V
Input current (5 V_{DC})	20 mA	20 mA
Nominal input impedance	220 ohm	220 ohm
Output voltage, max.	24 V_{DC}	12-220 V_{AC}
Max. load current	0.5 A	2 A
Max. leakage current	30 micro A	4 mA_{eff}
Max. switch-on time	40 micro s	1/2 period
Insulation resistance between input and output	1,500 V_{eff}	2,500 V_{eff}

The faculty will also undertake to develop SSR types meeting other user needs.

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FOREIGN TRADE ENTERPRISE SEEKS MISSING CHIPS FROM SOVIET BLOC

Budapest IMPULZUS in Hungarian No 14, 12 Jul 86 p 12

[Text] The Elektromodul Foreign Trade Enterprise handled the bulk of the parts manufactured by the MEV [Microelectronics Enterprise] in domestic trade and in socialist countries (with the exception of the equipment oriented circuits). This meant parts worth a total of 1.5 million forints per year. According to the data of the KSH [Central Statistics Office] the value of the import of semiconductor devices was 1.9 billion forints in 1984. Thus far the MEV had been shipping only the so-called discrete semiconductor devices (diodes, transistors) to Electromodul. Shipment of integrated circuits which carried out the functions of several transistors or diodes (catalog circuits) was to have begun now.

Elektromodul is trying, on its own, to replace the missing chips, which means that even if successful the users will not need a subsequent import permit. In addition to the semiconductors used here at home they must also replace those circuits which Elektromodul exports to socialist countries in exchange for the import of parts of similar value. Naturally a continuous parts exchange can be maintained only if the Hungarian side also fulfills the obligations undertaken in the quotas. There is a guarantee for this because a few days after the fire talks began at the Budapest International Fair on how the socialist partners would be able to rush to the aid of the Hungarian side, partly by shipping the chip types previously manufactured by the MEV and partly by not ceasing their exchange shipments despite the temporary interruption of Hungarian export. Manufacturers with a microelectronics profile offered their aid within a short time in response to a circular letter from the minister of industry to the socialist countries. The government has provided 4 million dollars for the further realization of the microelectronics program; Elektromodul got 900,000 dollars of this to purchase finished products while 3.1 million will go to longer range replacement of the circuit manufacturing lines.

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RETHINKING OF HUNGARY'S MICROELECTRONICS PROGRAM CONSIDERED

Budapest NEPSZABADSAG in Hungarian 1 Jul 86 p 5

[Article by Katalin Bossanyi: "Modifying the Domestic Microelectronics Course? A Meditation After the Fire"]

[Text] At the end of May the most important plant of the Ujpest site of the Microelectronics Enterprise burned to the ground; two element manufacturing lines--representing the middle phase of a complex technology--set up last year in the wake of the electronics development program were destroyed. The immediate damage can be estimated at two billion forints, but in regard to the ripple effects something else and more than this is involved--the development embodying and even symbolizing our catching up technically became the victim of the flames.

Public opinion will be informed in detail about the causes and circumstances of the catastrophe--following the conclusion of a comprehensive investigation. But now, as those interested have gotten over the first shock caused by the fire, a question is being asked ever more widely: Might not the forced situation offer an opportunity to reexamine, on the basis of current information, the conception thus far for the manufacture of microelectronic parts and put into the foreground new solutions, with some modification of course, solutions which in the longer run will serve better than the earlier ones a catching up on the market by the manufacturers of finished electronics products and, indirectly, the competitiveness of the entire economy?

A Delayed Development

A meditation about this is all the more justified because the path taken thus far--despite the indisputable achievements, especially the knowledge and experience acquired and the mastering of a new industrial culture--can be called a success only in part. The one-sidedness can be attributed in part to the fact that the central development program started at the beginning of the 1980's with a significant delay. It would be a mistake not to note that the decision was preceded by a passionate debate of many years which gave scope for prestige positions and partial interests instead of technical and economic considerations. By the time those responsible had decided on the development the technological gap between us and our international competitors had widened indeed. In addition the program was begun in a period quite poor in capital--

and with embargoes limiting the import of developed technology--which from the outset favored compromise solutions. The effect of this not only spread to the realization of the development, heavy with preparations, and to the choice of location and technology, it also influences the present search for paths and the possibilities for further progress.

These are the facts: The development realized at the Microelectronics Enterprise, valued at about three billion forints, made possible--together with computerized design and mask manufacture--the processing of 120,000 silicon wafers per year. According to the goals of the program, in the wake of the development, the diodes, transistors and integrated circuits manufactured by the MEV [Microelectronics Enterprise] would have satisfied 50 percent of the needs of the domestic processing industry by 1985. In contrast to this the capacity had come up to only one third of the needs--before the fire. The users made up the shortage in smaller part from socialist import and in larger part from capitalist acquisitions, and a number of factors influenced the shift in ratios. Among these a determining one is that from the beginning the MEV prepared to manufacture only 600 types, in contrast to which the users assemble their devices and equipment from about 5,000 types of microelectronic parts. Setting up to offer an entire assortment, of course, would not have been rational earlier, nor is it now. For this reason the original conception prescribed, technically and economically most rationally, an expanding assortment exchange with the socialist countries. But we can get good quality parts from our socialist partners only if we also give similar ones in exchange. From the beginning the MEV exported the larger part of its products--it had to. The necessity should be interpreted in this way: not only did less come here but--because of the problems of CEMA cooperation--the parts shipped in exchange were sometimes late or there were quality problems for the users. It represents a further problem that the developmental aspirations were aimed not so much at mass manufacture of electronic parts--the so-called catalog parts--rather they were preparing to develop and design the equipment oriented circuits representing a good bit higher intellectual and technical value. Later, however, it turned out that the receptivity of the large users for these continues to be low.

All this indicates the structural tensions of the development thus far, tensions further complicated by quality and price problems. It is also a contradiction that thus far we have been obtaining the great majority of the special, custom microelectronic parts--those which are a good bit more expensive--from capitalist import, while the mass manufactured products which we make here at home--or purchase from the socialist partners--could be obtained on the world market very cheaply now. The prices of the MEV are 40-50 percent higher than the world market prices while socialist import is 90 percent higher. In order that this paradox should not put the users into an impossible situation significant state support is built into the prices for socialist import and domestic parts manufacture. (Of course, the MEV parts are not this expensive out of monopoly considerations. The relatively small series size and the high investment costs limited their freedom of movement in advance.)

These questions again brought to the surface the "ancient" conflict of interest between users and parts manufacturers. The essence of the dilemma--in the resolution of which the situation which has developed after the fire could really be a watershed--can be formulated as follows: Must we, should we revive a domestic microelectronic parts manufacture which requires great investments but has limited efficiency? Would it not be better to have done with the "dreams" of earlier years and turn the available capital to a more selective but swifter development of those manufacturing finished electronic goods, a branch which is a driving branch in the economic and social sense and one which produces largely for export, instead of investing it in parts manufacture, which is literally dead in the ashes. Well, unfortunately, asking such a question would be justified only in a world more rational than the present one. It would be justified in a world where political considerations did not--from time to time--limit commercial contacts. But in the absence of all these conditions we should not--we cannot--give up the development of domestic microelectronics parts manufacture, because this would strengthen the dependence of our industry, putting it at the mercy of others, in the wake of which--sooner or later--our competitiveness would suffer.

A High Degree of Flexibility

This Gordian knot of industrial policy in this sense must be cut! The question of how, when and what, a question requiring conceptional renewal as well, remains open. The Ministry of Industry--putting aside the "defense of the uniform"--is now trying, with a high degree of flexibility and really with a careful weighing of the longer range industrial policy and economicalness considerations, to find a solution to these burning tensions; and not in an easy situation.

The first thing needed is to make up the shortage caused by the fire and ensure the continuity of production at the MEV or at the user enterprises. Since the catastrophe affected only the middle phase of the technology the most obvious solution seems to be to import the processed silicon wafers which can be obtained in bulk on the world market. In this way it would be possible to continue to exploit the capacity of the finishing plant in the Gyongyos factory of the MEV which was not damaged. In addition the import of finished parts should be increased somewhat on the basis of the needs of customers. (Four million dollars in "urgent relief" will make possible the carrying out of both actions.) But the shortage might also be relieved by "converting to production", with some modification, the experimental plant of the MEV--not affected by the fire--thus far serving only research and development goals. The mini-plant could be producing by September, guaranteeing the replacement of the simpler parts, or it could produce a base for the continuity of the CEMA exchange. The swift measures also include the fact that the experts are considering leasing manufacturing lines already operating abroad. This would not run into obstacles because we already possess the knowledge on the embargo list, and the manufacture could be checked on the spot. The KFKI [Central Physics Research Institute] and Videoton have also offered their capacity for the manufacture of more complicated parts and integrated circuits; of course, to do this it would be necessary to buy new supplementary equipment. An effort by the Communications Engineering Cooperative fits in well with the bridging measures--a modern, medium size plant was finished some time ago for the

larger series assembly of equipment oriented circuits on the basis of ad hoc orders. The customers are being brought into the planning phase now as well, thus relieving the burden on the MEV.

Bridging Actions

All this, however, can provide a solution--and not without difficulties--only for the transition, for that period--and this is at least 3-4 years--until a new microelectronics parts manufacturing plant is built. And however self-evident it is that we must carry out this development it is just as unambiguous that there can be no thought of a formal replication of the plant which burned down! Economic, technical and market foresight all dictate that if we must now think about a new comprehensive development then we must realize element manufacture of such series size, assortment and quality as will meet better than the earlier ones the profitability requirements and will be capable of adjusting to the swiftly changing needs of the users. This should be the chief direction for satisfying the recognized need for a course modification which can be carried out!

There is no doubt that acquiring the technology suitable for this and an accelerated realization of the development will also raise new dilemmas. To put it in polarized terms, in the present situation of our economy any supplemental or pushed forward development can be imagined only to the detriment of the growth of other branches or enterprise groups. Even if we cannot defend against it we can at least moderate this contradiction if we do not rely in the new development on domestic capital alone. Following the fire a number of capitalist firms expressed a readiness to found a mixed enterprise; discussions are under way. A swift realization of the offer of the Soviet partners would be even more advantageous. They also proposed--in the name of strengthening more direct enterprise contacts--the founding of a joint manufacturing enterprise. It would be proper to take advantage of both possibilities as soon as possible, although it would be naive to think that this is a way to relieve the burden on the central budget. It cannot be denied that the government also will have to reach into its pockets to realize a supplemental, expanding development. But it is also proper to consider that the justification for the investment is given not by narrowly interpreted electronic or industrial viewpoints but rather by national economic interests which will improve our competitiveness over the longer run. A series of analyses proves that during the time of the Seventh 5-Year Plan--even independent of the catastrophe--we would have had to reconstruct the finishing technological phase of element manufacture at Gyongyos and that around 1988 we would have had to begin a renovation of the plant which has now burned down. The central development programs already adopted provide cover, in part, for these goals. What is lacking is amortization on the destroyed plant, or the profit of the lost production. This must be advanced from some source, because in the present situation we can make a farsighted and economical decision only if we move forward in time the two planned developments and realize them in a coordinated way.

Now we are forced to move. But, arguing precisely from the ill-matched developmental decisions of the past period, we should make of this necessity, if not a virtue, at least compromises cleverer than the earlier ones. For

example, we must decide quickly about the schedule for the new investment--one way or the other we must decide. For due to the accelerated moral obsolescence of the electronics industry we could gain millions here by winning time.

A Forced Move

There is yet another very essential precondition for a conceptional course modification. There is a definite need for a substantial change of attitude on the part of the organizations of the electronics industry, for a strengthening of their readiness to cooperate. The felt and real errors of the earlier investment did make the parts manufacturers and users opposed to one another. For this reason it can also be said that the development of a new parts manufacturing base on associated, joint capital investment foundations, in addition to the indispensable central aid, might well resolve the recriminations and shifting of responsibility which reign today. Even without any special gift of prophecy it can be predicted that the path leading out of the present tight situation of the electronics industry can be sought--and found--through the recognition and realization of common interests.

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ROLE OF ELECTRIC POWER RESEARCH INSTITUTE IN TECHNICAL DEVELOPMENT

Budapest ELEKTROTECHNIKA in Hungarian No 5, 1986 pp 145-147

[Article by Dr Gyorgy Vajda, graduate mechanical engineer, member of the Hungarian Academy of Sciences and director of the Electric Power Industry Research Institute: "Participation of the Electric Power Industry Research Institute in Technical Development"]

[Text] I hope that the articles published will show that our institute has endeavoured--not without success--to play the role expected of it in the innovation process. The significant resources of the VEIKI [Electric Power Industry Research Institute] provide a basis for this. In first place I might mention the very carefully selected research staff of about 160 persons, a staff consisting of outstandingly trained experts with broad experience and language knowledge embued with a love of work and an awareness of responsibility. Their professional training embraces many specialties making possible an interdisciplinary approach to the heterogeneous tasks, Our varied and modern tools base represents the second important resource; some of our laboratories are notable not only in the national but even in the European respect. This is indicated by the fact that even foreign institutions, not only from socialist countries, make use of our furnace technology, flow technology, water chemistry, high voltage, high performance and computer technology equipment, and not rarely it plays a considerable role in supporting the export possibilities of our factories. We try to link together the resources with the development of a place of work atmosphere which, on the one hand, ensures individual success with high quality tasks and the possibility of creativity and, on the other hand, creates a public spirit so that the real feeling of success is represented by service to industry, by the practical realization of the results. In large measure we can attribute to this--and to a fortunate professional profile--the fact that 80-85 percent of our achievements are actually used in practice in some form.

Our many layered system of professional contacts must also be listed among our resources. Naturally these contacts are strongest with the MVMT [Hungarian Electric Works Trust] and its enterprises, but they also embrace very many enterprises and institutions in other professional areas, so we have a broad overview of the possibilities and needs of industry. Often we play the role of

intermediary between manufacturers and users, which is not always an agreeable task but for the most part it offers a way to work out the national economic optimum.

We educate our colleagues to be scientifically demanding. The practical tasks and the character of applied research do not exclude the discovery of theoretical interdependencies or an approach on a scientific basis. Indeed, this is all the more necessary because it encourages the birth of new ideas and the high level solution of a task often provides a more complex, better founded and even swifter answer to concrete problems. The success of linking theoretical and practical activity is shown by the fact that many of our achievements have reaped significant success at international scientific forums, a large number of our workers have won advanced scientific degrees (14 percent of our present research staff) and about 100 institute patents indicate the practical results.

One of the ordering principles of our activity is to support the chief goals of energy policy. Our activity is directed at expanding the use of coal, largely in regard to the system of power plants. We have had a role in the creation of every large power plant and in solving the more significant technical problems arising at them. Changing the fuel, modifying the operational conditions or design errors often produced complicated problems, frequent breakdowns, scorification, swift erosion or corrosion, impermissible environmental pollution, performance deficiencies or low efficiency. Preventing these things and improving efficiency or operability often involves a very profound study of physical and chemical processes. Out of our work of this type in recent years special mention must be made of the modernization of the firing equipment of the Gagarin Thermal Power Plant. We play a role in the reconstruction of old power plants in order to modernize the technical parameters of them. We are laying the foundations of new firing procedures, for example with fluid stoking or the burning of suspended coal. Often we must adapt our knowledge in sectors outside of power plants, not only in the large heating systems of industrial plants but also in the case of small equipment.

The conservation of hydrocarbons has also received appropriate priority in our work. Our high performance automated burners which alternately burn gas and oil with good efficiency have won broad application in power plants, heating plants, industrial furnaces and other installations in the interest of both management and energy conservation. Our new achievements are igniting and supporting burners burning coal powder in the place of oil fired burners in coal furnaces. An important work of recent years has been our participation in working out peak performance technologies for hydrocarbon power plants. A clarification of the thermal, mechanical, chemical and other processes laid the foundations for starting and stopping methods and minimal loads which increase life expectancy.

We have undertaken a significant role in creation of the Paks Nuclear Power Plant, putting it into operation and supporting its operation. The technology of the make-up water preparation system, the atomically pure ion exchange resins, the microprocessor temperature control equipment of the generators, the fire protection technology of the cable network, the hermetic conduction of the power transmission cables, the large current bus bridge, various

protective devices and many other elements of the power plant demonstrate our material contribution. But the intellectual component is much greater than this. The safety analysis to protect the environment, the studies simulating transient processes, the computerized breakdown analysis, optimization of the operation of the water system and various studies connected with putting it into operation all saw practical use. The testing method we developed and put into practice to check the solidity of the hermetic locality system guaranteeing the safety of the environment counts as a pioneering effort in the socialist camp. The diagnostic method and equipment we developed to analyze the vibrations of mechanical equipment in the primary zone, to indicate embryonic failures, are most advanced. This counts as a new field, and not only in nuclear power plant applications. The same applies to the finite elements testing technique for statics problems; we have already used the program systems worked out for this purpose to give answers to questions arising not only at nuclear power plants. In the international division of labor for nuclear power plant machine manufacture we have had a pioneering role in domestic manufacture of water treatment systems and we are trying to develop this further in the direction of automating the systems and in the direction of high temperature filtering.

We are trying to encourage energy rationalization primarily in the area of electric power. Making use of the waste heat of large equipment, our new cable design, saving material and energy, manufactured by the Cable Factory, the low loss bus bridges, our synthetic liner used in wet cooling towers, which not only saves energy but ensures a greater life expectancy, or our work to modernize public lighting, which saves energy and provides better lighting, are examples of new designs born in the institute. But the systems level savings are even greater. We have not only supported an economical load distribution with many sorts of computer programs and concrete studies, we have also developed a multiple layer equipment family which has contributed in many ways to realization of the National Electric Load Distributer, to telemechanization and computerized control of the power providing enterprises and to load distribution and automatic operations guidance within the power plants. The voltage idle output regulating system being realized will mean additional possibilities.

Our activity often goes beyond the area of electric energetics. Our telemechanical systems to optimize energy management are used in the petroleum industry, paper industry, at water works and other industrial installations. Our heat pipe waste heat utilizer resulted in a 5 percent efficiency improvement in the pipe stills of the DKV [Danubian Petroleum Industry Enterprise], our cooling tower solutions are used in large numbers for small industrial coolers, our burners have found wide use in a number of areas of the people's economy, our water treatment and purification technologies, saving energy and chemicals, have been adopted in many areas of industry. The pioneering role of the institute in the energetics applications of the new possibilities of electronics is well known. The automatic devices developed, the protective equipment, telemechanics, measuring equipment, microprocessor devices, computer supervisory and operations control systems not only facilitate operations by providing and evaluating information quickly but also by automating the necessary intervention. These devices represent a great step forward in the development of optimal operations and thus in the direction of

minimizing losses. But their effect grows beyond even this, making possible a more rational use of equipment and networks, increasing the security of energy supply, which, indirectly, reduces the investment requirements.

Moderating the electric power investment needs is a special interest of the people's economy. We try to contribute to this with solutions which do not reduce the security of supply. In the development of a sound frequency cycle control which reduces peak loads our role is the solution of systems level problems, selecting the parameters of the control signals and realizing the high voltage coupling equipment. Our insulation technique research has led to reducing the size of power line columns, our cable studies have led to greater loadability of long distance lines and our automatic and protective devices have made it possible to reduce the necessary reserves.

The second great ordering principle of our activity is the national research plan. We have undertaken a role in a number of tasks of the National Medium Range Research and Development Plan (OKKFT) and of the branch programs, sometimes playing the role of base institution. Some of the previously mentioned tasks of energetics are connected with these too but going beyond these we have a link to the aluminum industry, computer technology and environmental protection OKKFT programs and to the ministerial programs serving nuclear energetics machine manufacture and the export oriented electric industry development.

We also try to support the development of the manufacturing industry with our activity. Our unique experimental possibilities and well prepared staff have made possible the answering of many technical problems of industry. We do not consider it a disgrace that our achievements of this sort are integrated into the technical development achievements of industrial enterprises and that the emblem of the institute does not figure in the new designs. But there is also a good bit of modern equipment which does bear the name of the VEIKI. Coal grinding mills, alternative burners, cooling elements, solar collectors, network protective devices, telemechanics, remote transmitters, special instruments, water treatment equipment, stations encapsulated in aluminum housings and many other products are examples of this.

The institute also plays a significant role as a cadre school. About 40 of our colleagues have gone into leading positions in other organizations. It is not a pleasure to see talented colleagues leave the institute, but this is counterbalanced somewhat by the fact that they are successful as university professors, enterprise directors and chief engineers, leaders of research and planning institutes or leading workers in the state apparatus. Finally, it is not gratifying but it reflects the professional level that many of our researchers who have gone abroad, not a large number, have followed similar careers and one can find among them MIT professors and the technical leaders of large corporations.

The central goal of our institute is to contribute maximally to solving the present problems of the people's economy. But along with this we cannot lose sight of the longer range perspective; a research institute has an obligation to prepare the future, even at the price of risk. Judging the justification of such tasks is not always unambiguous. The outside professional public opinion

almost uniformly opposed the development of electronic protective devices when we took the lead in this work, even on an international scale. Today more than 6,000 examples of a device family consisting of more than 30 types are in operation to the complete satisfaction of the users and the products are competitive on every market. Ten years ago the organs responsible considered our preparation for nuclear energetics unjustified; today they consider this work of ours indispensable. At the beginning of the 1960's the replacement of a small network sample with a computer ran into great resistance; this step not only increased the potential of the institute to a large degree, it also proved to be a significant step for the early adoption of the computer culture in electric energetics.

In our recently compiled 5-year plan we tried to attend to the needs of the present and future in a harmonic unity, lest the problems of the present become obstacles to the technical possibility of a later more dynamic development. The collective of our institute is not only capable of solving these tasks it is also embued with an awareness of responsibility, that it should participate suitably in solving the problems of the people's economy.

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ORGANIZATION OF NATIONAL TECHNICAL DEVELOPMENT COMMITTEE

Budapest IMPULZUS No 13, 28 Jun 86 p 31

[Article by Dr Laszlo Mohacsy: "The Organization of the OMFB"]

[Text] As of 1 January the Council of Ministers changed the statute for the National Technical Development Committee (OMFB). (We reported on this in our issue No 4, of 4 February.) In accordance with this the OMFB receives--in addition to its previous tasks, primarily giving opinions, coordinating, giving advice--a more outstanding role in the development, implementation and execution of technical development policy.

The Plenum and the Office

There is no need for fundamental change in either the body or office of the OMFB, for the new government resolution determining the tasks, authority, organization and operation of it does not change any requirement. But the change of emphasis within the tasks is accompanied, unintentionally, by organizational consequences.

The body, the Plenum of the OMFB, has become an organ of the government organs, to give opinions and make recommendations. Thus it does not stand--cannot stand--under the single person guidance of the chairman of the OMFB. The chairman guides the sessions of the body simply as a "chairman." Its members are not dependent on him and cannot be given instructions. The Plenum, which expresses its opinion in questions of national economic significance interdependent with technical development, develops its positions with parliamentary methods and passes them on to the appropriate government organs. Democratism also requires that Plenum members not agreeing with the majority position can request the inclusion of their differing opinion in the minutes of the meeting.

The Plenum is a technical-economic expert body and not a state reconciliation committee. For this reason the representatives of the ministries and of the state organs with national authority--whether at the minister or chairman level--are left out of the new Plenum. On the other hand, the ratio of enterprise guiders of the economy, industry and technical development has increased in the Plenum.

The chairman determines the organizational structure and operational rules of the office of the OMFB. Instead of the "chairman" role he has in the Plenum he guides every organizational unit and all workers of the office as a "president." The office is the apparatus of the chairman--as a ministry is for the ministers. The statute does not provide any guidance change in regard to the office.

The professional character, the technical expertise, must be realized in the office organization as well. This requirement--we might call it an objective requirement--is satisfied by the organizational units called special secretariats and by the offices created to take care of central economic development programs and other special state research and development tasks.

The present changes--adjusted to the expansion of the tasks of the OMFB--affect these two categories most of all. A new special secretariat, the Materials Conservation Special Secretariat, has been formed to guide the office projects of the central economic development program "Technological Modernization Aimed at Economical Material Use" and of the OKKFT [National Medium-Range Research and Development Plan] program titled "Economical Material Use and Use of Waste and Technological Modernization Connected With This." Also newly created is the Materials Technology Special Secretariat. Its chief task is to carry out the organizational and coordination tasks of the OMFB deriving from the plan system titled "The Complex Program for the Scientific-Technical Progress of the CEMA Countries Up To the Year 2000--Chief Directions of Manufacturing and Processing Technologies for New Materials" and from the ministerial program titled "R and D Tasks Aiding Industrial Use of the Achievements of Materials Science."

Another new organizational unit is an operational work organ for the committee responsible for the realization of the Central Economic Development and Organizational Program for the Spread of the Social-Economic Use of Electronics (the EGP). This unit is a secretariat (the EGPT).

The Electronization Research and Development Program Office (EKPI) was formed as a new program office, as an operational work organ for the guidance of the OKKFT program designated G-1 and titled "Computer Technology, Telecommunications and Automation R and D Tasks of Electronization." A program office (the AGPI) is to be formed within the framework of the Material Movement and Packaging Institute to organize execution of the newly created central economic development program titled "Technology Modernization Aimed at Economical Material Use" (AGP).

The OMFB will continue to make use of the existing program office at the KOGEPTERV [Metallurgical Machinery Design Bureau] to organize realization of the OKKFT program designated G-2 and titled "Economical Material Use and Use of Wastes and Technological Modernization Connected With Them" (the AKP).

The earlier Agricultural Special Secretariat and Food Industry Special Secretariat have been combined under the name of the Foodstuffs Economy Special Secretariat. The Environmental Protection Special Secretariat has been abolished, or rather absorbed into the Transportation and Water Management Special Secretariat.

The Energetics Special Secretariat, the Raw Materials and Metallurgy Special Secretariat, the Chemical Industry Special Secretariat, the Machine Manufacture Special Secretariat, the Electric Industry Special Secretariat, the Electronics Industry Special Secretariat, the Automation and Computer Technology Special Secretariat, the Construction and Settlement Development Special Secretariat, the Light Industry and Service Technology Special Secretariat and the Protein and Biotechnology Office, the Corrosion Protection Office, the Systems Analysis Office and the Industrial Design and Ergonomic Office continue to function.

The other large group of organizational units carries out horizontal office tasks--of a functional character. The Research and Development Main Department deals primarily with R and D planning, financing and preparation of science policy decisions. The Plan and Economics Main Department is responsible primarily for working out the technical development policy conception and for the participation of the OMFB in the further development of the economic guidance, planning and regulatory system. The large scale domestic participation in the CEMA Complex Program has significantly increased the tasks of the International Contacts Main Department. The Chairman's Main Department takes care of the legal, administrative, information and enterprise and association supervision obligations of the Office; it is responsible for preparing the sessions of the corporate organs and for controlling and signalizing the workings of the Office.

The main departments, the offices and even the special secretariats are organizational units with few people--the latter two consist of an average of 2-4 people. Their professional work is supported by the "invisible main departments"; so-called ad hoc theme committees are organized to solve concrete technical-economic tasks, to prepare studies and to judge development competitions.

Finally the Personnel and Labor Affairs Department and the Budget and Finance Department perform tasks in the OMFB similar to those in other chief authorities.

The office of main group chief was created recently by the chairman of the OMFB as an important mission within the Office. It is the responsiblity of the main group chiefs to provide direct supervision of the office units designated for execution of the central economic development programs entrusted to OMFB guidance--the electronization program (EGP) and the technological modernization program aimed at economical material use (AGP). In addition, they coordinate the work of these organizations with those tasks of the other organizational units of the Office which are connected with realization of the EGP and the AGP.

The chairman, with the help of three deputies, brings together and guides the main departments, special secretariats and other organizational units of the Office.

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NATIONAL TECHNICAL DEVELOPMENT COMMITTEE'S 7TH 5-YEAR PLAN

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[A compilation by Dr Edit Javorka, candidate in economic sciences and coordinator of theme committee]

[Excerpt] Developmental Ideas for the Seventh 5-Year Plan Period

Taking into consideration the possibilities and the conditions a modernization of the research and development infrastructure--as a result of which it will reach compatibility in the level of supply representing a condition for international cooperation--is a longer range process (10-15 years). Because of the limits on resources for the Seventh 5-Year Plan there is no possibility for frontal development. There is a need for a development of emphasis, for selectivity, and use of developmental methods which will make possible progress in the form of building blocks, supported on one another.

(This conception does not extend to the human factors of the infrastructure for technical development because the development of these is prescribed within the framework of other measures in the Seventh 5-Year Plan. We will return in IMPULZUS to the given status of the intellectual potential, as one of the human factors.)

Developmental Priorities

Taking into consideration the needs and the possibilities we have no alternatives when designating the priorities for the development of the infrastructure for scientific research and technical development which can be prescribed during the Seventh 5-Year Plan. Our studies also prove that the material assets available for the research and development infrastructure are backward, not only in comparison to the competitors which might be considered but even in comparison to our own developmental level. The obsolescence of the infrastructure even hinders to a large degree the exploitation of the R and D intellectual potential and greatly prolongs the time from research to use.

We are extraordinarily behind in building up a modern system of information contacts for research and development. But a system of information contacts using the tools of electronics not only helps speed up the flow of information

it also becomes a uniter and organizer of R and D activity and determines its methods of work. Nor is the traditional library service constituting the foundation of a modern information system at an adequate level.

There is no adequate institutional system for measurement, grading and quality control services for research and technical development; the instrument bases forming an infrastructure for R and D are missing. At present there are hardly any regional or special area instrument centers and the existing instrument inventory is extraordinarily old and obsolete. The instrumentation for measurement and quality control institutions is obsolete too. But the use of large instruments and the related complex instrumentation and supply of experts are increasingly indispensable in modern measurement technology. The high cost and accelerating obsolescence time of large and medium instruments require the creation of measurement centers or instrument bases which, by serving many users, will make possible economical operation and the possibility of replacement (modernization) proportional to the obsolescence time.

The supplying infrastructure is obsolete. For example, the mechanical and electronic shops serving the research and development sites are not capable, in the given, scattered organization and with their low technical equipment, of satisfying the high precision and high technical level needs of R and D. For this reason, to a large extent, the time extending from research, through experimental development, to the practical use of the results is getting longer. Obtaining the small quantities of materials needed for R and D activity is very time consuming and clumsy. But it must be noted that a large servicing infrastructure must gradually take over the role of the individual shops and devices and although the individual solutions and the shops serving smaller, individual research units will not disappear quickly the weight of our infrastructural developments must be shifted to systems which are adopting new technologies.

We are also very backward compared to our world market competitors in building up automated technical designing. Automated technical design makes possible a shortening of the time needed for experimental and designing work, a reduction in costs and a quick study of various alternatives. Our backwardness is causing serious losses in market competition and--among other things--in the possibility of winning bids.

Progress in these areas was very swift in the world in recent decades while the possibilities for domestic replacement development moderated--to a degree well exceeding the reduction in national economic investments.

The priorities for R and D infrastructure developments--supported from central sources--in the Seventh 5-Year Plan period are:

--acceleration of the creation of a modern electronic system of information contacts and the development of a primary source base, the traditional (library) system, constituting the basis for this;

--building up the infrastructural instrument bases and modernization of the existing bases; improving the instrumentation of the measurement and quality control institutions;

--development of the supplying infrastructure, primarily the experimental shops and the acquisition possibilities;

--development of the automated technical design system.

As a result of the limits on available sources there is a need for selective development even within the emphasized areas. We must designate those task groups which will best help the practical utilization of R and D achievements and increase the technical level and in these groups we must urge the appropriately combined development of the information system, instrument investments, experimental shops and automated technical design systems. We must make possible combination developments which will lay the foundation for research centers or innovation parks.

Among the institutional factors of the research and development infrastructure special treatment should be given to standardization, industrial law protection and technological transfer. The material assets needs for the development of these areas must be made available to the burden of the investment allowances of the Seventh 5-Year Plan.

The task of the National Technical Development Committee and of the Hungarian Academy of Sciences is to work out detailed programs (this is being done), coordinate the professional aspects and the various--central, research institute, enterprise--sources and implement and guide the developmental conception.

The Information Infrastructure

The information infrastructure for research and development is a complex concept; it means a sum of economic, organizational and professional information and data, which is a precondition for research and development work and not an organic part of research activity itself. The concept includes also a system of tools with which we create, store, process or pass on the infrastructural information data. The developmental conception extends to the formation of tasks connected with these concepts:

--development with the aid of modern information technology, and
--development of the traditional information system.

Development of a Computerized Information System

In the detailed development program to be worked out there must be a definition of that sphere of information services which can be attained overall, the sphere which is indispensable for the domestic research and development community. The goal is that the user picture of the service should be uniform all through the system.

The development of a computer network offering many services over a large area is absolutely necessary for the development of information services. Such a system is an indispensable condition for international research and development cooperation.

The most optimistic appearing ideas for the development of the information infrastructure for research and development involve the following:

--The MTA [Hungarian Academy of Sciences] Computer Network has been developed already with the cooperation of the research institutes of the MTA and it has been operating for some time. The equipment of this network could be the nucleus for a computer network offering significant services.

--The physical and applications networks which operate in the research institutes of the academy, at the several ministries and chief authorities and in institutions could be transformed into information subsystems.

--As the third phase in the creation of the entire domestic R and D information system there will be a need for integration of the already operating subsystems.

Creation of the tool base for the information infrastructure could take place in the following steps:

a. Large computer systems must be set up dedicated to the creation of inclusive information data banks, systems which can be connected into a network. Creation of an experimental system could begin in 1986 using the central computer and computer network of the MTA.

By the middle of the plan period we must set up a dedicated large computer system serving this purpose. Even in the experimental phase care must be taken that the chief authorities, institutions and research communities desiring to link up can access the services of the system.

b. Local networks should be installed in larger institutions. The installation of these in a minimal configuration (one which could be easily expanded later) could be completed in 1986. Local branches based on 16-32 bit microcomputers which can link into the Academy Network should be established for small institutes and research groups. (Such larger capacity microcomputers could be obtained from import, but domestic manufacture of them has begun also.) In both cases the most critical point is the creation of a large capacity local disk background--and this can be done only by import.

c. Common terminals can be installed at some of the research work sites and 8 or 16 bit personal computers can be installed at others. These can be obtained already at an acceptable price and in sufficient quantities to solve basic office automation and other services.

d. One possibility for realizing network file server functions is use of megamini computers (TPA 11 440, VAX), another is a system based on domestically developed microcomputers. The acquisition of printers causes a problem from the viewpoint of installing printer stations. The needs cannot be

satisfied from the socialist market at this time. Capitalist import will continue to be necessary to produce print quality materials. Servers controlling printer stations can be developed from existing devices. Communications servers can be created only on a domestic development base--because of the embargo.

e. Graphics stations, which are indispensable especially for engineering work sites, will have to be produced with domestic development because of embargo limitations. Domestic developments thus far provide a suitable basis for this.

Development of the Traditional Information System

Suitable information support for research and technical development is unimaginable today without use of modern computer technology devices and remote data processing on the one hand and without a suitable supply of books and journals and the necessary reproduction tools on the other.

The following can be prescribed for the 1986-1990 plan period:

--Setting up a computer dedicated to library and documentation processing and equipping the work sites with terminals. The goal of mechanization is modernization of organizational work, cataloging and journal records.

--Obtaining intelligent terminals for the documentation and library work of users. This equipment will be called on to serve creation of small local databases on the one hand and, on the other hand, the importance of querying international databases is increasing.

--The original text of documents must be obtained. A precondition for this is maintaining journal and book acquisition at least at the present level.

The goal for the turn of the century must be a spread of the computerization of information and library work and the introduction of new types of services for the entire library network.

Building Up Instrument Bases and Measurement Centers

One of the fundamental determiners of the level and effectiveness of research and development is the quality of the instruments available. The instrument inventory in our country has deteriorated; one third of it is completely obsolete and must be replaced; another third is not modern enough and/or requires significant renovation; only a third can be used properly. The simplest way to solve our problems would be if by 1990, that is by the end of the Seventh 5-Year Plan, a large part of the existing scientific and testing instrument inventory were exchanged and the necessary quality development took place. This would require at least 15-20 billion forints in instrument investment. Taking into consideration the economic situation of the country such a proposal is not realistic. One could post as a goal the realization of the necessary modernization and reconstruction during three 5-year plan periods.

In the first phase of the reconstruction--in the period of the Seventh 5-Year Plan--there is a possibility for infrastructural modernization of the instrument inventory. The concept of infrastructure includes those measurement centers, instrument bases and grading institutions which serve research and technical development comprehensively and in a broad sense, satisfying various goals, which provide public services to organizations dealing with research and technical development.

The following developments must receive special treatment in order to modernize the R and D infrastructure:

--A further development of those existing regional instrument centers which have the high level scientific staff to operate some large instrument and which are capable of serving the measurement needs of their broader environment.

--Creation of new regional centers where this is fundamentally required by scientific research and development and where there is or could be the high level expert staff needed to provide large instrument services (Budapest has such centers, Debrecen, Szeged).

--With the aid of a rational uniformization or standardization in the course of acquisitions there must be a reduction in the present heterogeneity of the instrument inventory.

--Preference must be given to the acquisition of so-called super large equipment, the unique large instruments serving the competitiveness of Hungarian research and development (those aiding or indispensable for a broad sphere of research and development or for the small and medium general purpose instruments of the research and development network). A larger part of the resources must be turned to acquisition of very valuable instruments and only a smaller part to acquisition of medium level instruments. The research and development sites must use their existing resources for acquisition of small instruments.

--In the interest of more efficient use of the instrument inventory there is a need to broaden loaning activity and we must create the economic and organizational conditions for making use elsewhere of instruments which become superfluous at a given site. The loan instrument inventory of the Instrument and Measurement Technology Service of the MTA must be supplemented with investments financed from central sources.

Metrology

Metrology, as an institutional system, differs in many respects from the infrastructure of the instrument inventory. Its primary task is creation and maintenance of the "standards" embodying legal measurement units, which is a scientific-technical task demanding ever greater preparedness with the present demands pertaining to precision and other metrological characteristics. Based on these standards we must organize a network of use standards which stands up in the international prescription system for certification. The central organization of the National Metrology Office must be supplemented with a

university and research laboratory network and in this way we must create in our country a "Calibration Service" linked with the planned regional instrument centers.

Grading and Quality Control Institutions

The grading and quality control institutions must receive a greater role in the development of measurement technology too. They have an outstanding task in the area of technical development in evaluating the properties of new products, in comparative analysis of foreign and domestic products, in testing the materials used in production, in determining the parameters of products, in a functional grading of finished equipment and thus in attaining the technical-economic optimum.

The instrument inventory of the grading and quality control institutions must be improved. When working out a development program for the measurement and instrument infrastructure attention must be paid to the developmental goals of grading and quality control activity.

Development of the Supplying Infrastructure and That Aiding Introduction

The infrastructure supplying research and development and aiding introduction must be modernized. Out of the many components of this there must be a stressed development during the Seventh 5-Year Plan of the experimental shops and plants and the acquisition of small quantities of import materials must be modernized.

Experimental Shops and Plants

It is indispensable for an improvement of the effectiveness of research and development activity that we build experimental shops and plants which are capable of producing, at a high technological level and more quickly than is customary, the materials with special composition and properties needed in small quantities for experimental work and the precise and ultraprecise, high quality parts, tools and equipment and, in addition, offer computer aided services for products, tools, planning and measurement. Electronic and mechanical devices are of outstanding importance in the production of experimental equipment for research and development from the viewpoint of the future. The conditions and requirements in both areas have changed in recent years to such a degree that an entirely new approach is needed.

Shops for Electronic Parts and Assembly Technologies

In electronics the perfection of parts and assembly technologies requires investments of such magnitude that it would be unrealistic to aim at them in the sphere of research and development. The technical base of the institutes developing such tools is already behind the level of industry. And a swift renewal of technology is considered absolutely necessary in the interest of maintaining the competitiveness of industry. The research and development background can hardly reach this new level. Solving the R and D tasks on the basis of old technology cannot be imagined because their degree of reliability and complexity is closely interdependent with the new technologies. In

electronics this process is made up of the tools for computer aided design, microelectronic and other parts technologies, new methods of making cards and other subassemblies, primarily surface mounting, and the complex and expensive computerized testing systems to check these things.

In this regard the conception for the renewal of the R and D infrastructure is that except for the planning phase the entire technological chain essentially comes into being in industry. It must participate in those investments which are needed there also and the capacity of which will foreseeably be sufficient for the R and D tasks as well. Within this, depending on the acquisition possibilities and international developmental trends, one should consider at what level one must and can use the experimental, so-called pilot technologies which also serve industry (whether they are used in instruction, research or industry). This conception seems a realistic solution--not only from the viewpoint of the investment forint and foreign exchange needs but also because in such a way one can best link together the various elements of the innovation chain. The development of new tools will be built directly on the industrial technology, thus almost completely avoiding the redesigning and technology modifications which caused constant delays and debates earlier. This is also justified by the fact that, as we have emphasized elsewhere, in contrast to the earlier state of affairs, when the technological base of research and development was sometimes more developed than that of industry, a complete turnaround has taken place and this trend is strengthening quickly.

But even so the designing work stations and the software services aiding them remain distributed. Thus, with appropriately strong network links, the cooperation of designers must be made possible on the one hand and, on the other hand, we must make possible the linking of industrial technologies and designing, or the joint utilization of the very valuable software background.

The modernization of the electronics industry will take place in the Seventh 5-Year Plan period within the framework of a central development program. It is not yet possible to review the entire industrial expenditure, but according to the plans of the enterprises it will come to several billion forints. The research and development sphere might contribute to this with its own assets, that is with the OTKA [National Scientific Research Fund] and the central technical development fund--in such a way that it might provide some of the cover for the designing work stations, operation of software equipment and sharing in the technological utilization. We would like to sign contracts for these things on the basis of competitions, setting forth guarantees affecting deliveries.

Mechanical Type Shops

Almost all research-development-experimental activity is tied to jobs of a mechanical type. For this reason practically every research and development institute and even the majority of the natural science or technical faculties have created their own smaller or larger experimental mechanical shops and have fitted them with the necessary machine tools. Although it is possible to replace many earlier mechanical solutions with electronic devices the needs for mechanical material processing have not decreased in connection with electronization, rather they have increased because there is a need for ever

more reliable, more powerful parts with ever finer size and other tolerances. The well known fact that Eastern Europe has lagged in computer technology primarily because of the weakness of equipment demanding precision engineering is a characteristic indicator of this transformation.

As a result of its connection to the infrastructural network and in the interest of testing new production structures we must conduct a more open policy in this area of the infrastructure for technical development and research than in the other areas. More and more new tools are appearing which must be capable of being linked to the system and the several production technologies, the placement of the tools and organization of them into a system require quite varied solutions. Creation of a uniform, central service system would be an unrealistic goal in this area but one can aim at a system based on a few centers, especially if these centers had the culture which is needed for higher level production technology and if they themselves participated willingly in such experiments and undertook those guarantees which would create for research and development possibilities more favorable than earlier.

Small Volume Import Materials

The extraordinarily lengthy and complicated procedure for acquisition of small quantities of import materials is one of the most neuralgic parts of research and development activity. It is especially difficult to obtain solvents, electronic parts and chemical materials and high purity materials and chemicals for various purposes. Our existing regulations do not make a distinction in the acquisition procedural methods in regard to the import of small quantities of little value and the import of large quantities of great value. So we must develop a simplified procedure for the import of small quantities of little value in regard to the acquisition of materials needed for research and development activity.

Development of Automated Engineering Design

Parallel with the development of computer technology there has been a swift spread of automated engineering design (CAD) in the world because this greatly increases the efficiency of designing work and makes possible a reduction in costs or a substantial shortening of development time limits. (This is a condition for playing a successful role especially in forign bid activity.)

To a large extent CAD systems can be developed from modules which satisfy many types of user needs with relatively little variation. In our economy also we have taken the first steps in the development of CAD systems. But to operate CAD systems with good efficiency one needs both the tools and a systematic dovetailing of the information to be used in the CAD activity. For this reason (as well as others) a program serving the spread of CAD during the Seventh 5-Year Plan has been prepared at the OMFB [National Technical Development Committee]. The program is aimed primarily at developing the infrastructure for CAD. Its goal is the development of services aiding the spread of it and support for model systems of a few applications. The program contains 27 projects in 21 theme groups.

Development of the Institutional Factors of the R and D Infrastructure

Standardization

Domestic standards are at a high level, recognized even internationally. The comparative data in Table 1 reflect this fact. The domestic standards with obligatory effect are compared with the pertinent standards of CEMA, the International Standard Organization, the International Electrotechnical Commission, the Food and Agriculture Organization of the UN, the World Health Organization, the GOST of the Soviet Union and the DIN of the Federal Republic of Germany.

Table 1.

Compared to the More Important Relevant National Standards	Quality Prescriptions of Hungarian Standards			Safety and Health Prescriptions of Hungarian Standards		
	Same	More Strict	Less Strict	Same	More Strict	Less Strict
CEMA	80.4	5.4	14.2	88.0	3.8	8.2
ISO	84.4	2.6	13.0	73.0	--	27.0
IEC	83.4	8.2	8.4	98.0	--	2.0
FAO-WHO	71.8	17.1	11.1	83.6	8.6	7.8
GOST	80.0	11.4	8.6	84.6	7.7	7.7
DIN	79.2	5.5	15.3	79.0	3.0	18.0

A renovation of the information system for domestic and international standards is one of the important material questions for a development of standards work. This is linked logically to the general R and D information infrastructure.

The questions of principle for Hungarian standards work derive from the differences in international standards, those in developed countries, domestic standards and those for CEMA. The basic cause for these differences is that countries at different stages of development would like to achieve in standardization a strictness or leniency corresponding to their own level--to defend advantages which might be won in the competition struggle or to avoid disadvantages. We must follow a policy shown to be correct whereby the standard permits several degrees, these are shown on the product and this influences the customer and the price. Hungarian standards should try to raise the requirements system for domestic production and keep it at a high level in the interest of both international competitiveness and the domestic consumer.

Industrial Law Protection

Hungarian industrial law protection is modern. It is in harmony with the further development of the economic guidance system, takes into consideration the international aspirations and fits in organically with our legal system. The data shown in Table 2 illustrate the development.

Table 2.

	1975	1984	Index
Inventions:			
Profit realized, millions of forints	2,187.Ø	8,444.Ø	386.1
Annual profit per invention, millions of forints	2.4	6.7	275.3
Total profit in percent of national income	Ø.56	1.Ø5	187.5
Innovations:			
Profit realized, millions of forints	2,588.Ø	7,184.Ø	277.6
Annual profit per innovation, thousands of forints	42.9	117.8	274.6
Total profit in percent of national income	Ø.66	Ø.89	134.8
Industrial designs:			
Number under protection,			
of Hungarian origin	4Ø2	1,ØØ4	249.8
of foreign origin	62	445	717.7
Trade-Marks:			
Number under protection,			
of Hungarian origin	2,Ø87	4,244	151.2
of foreign origin	14Ø,22Ø	16Ø,212	114.2

But we cannot be satisfied even with the developmental trends worthy of recognition. The level of patents (compared to population or the GDP), a good bit lower than the industrially more developed countries, indicates that our technical creations have lagged behind those of our external market competitors. But this is not a deficiency of the industrial law protection sysbem, rather it is a sign of the backwardness of technical development.

Hungary today is a member of every important international industrial law protection agreement and conducts active industrial law protection cooperation in the World Organization of Intellectual Property and in CEMA, at the inter-state and enterprise level alike.

A contradiction appearing from time to time and in some cases between the systems of certain CEMA countries (author's certificate--state industrial law property) and the international systems (product protection) and harmonization of these with the Hungarian system causes difficulties in industrial law protection work. The development of the Hungarian economic guidance system speaks for the patent system now used in our country. International talks are taking place on the theme of authors' certificates. There should be a study of whether, in addition to process patents and in accordance with the international trend, there should be broader use of the product patent as well; this affects primarily the pharmaceutical industry, the chemical industry and biotechnology.

The biggest limit on the development of industrial law protection now is the backwardness of the industrial law protection information system. The basis for the domestic industrial law protection information system is the collection of the Patent File operating within the framework of the National Inventions Office. The present arrangement of the Patent File is extraordinarily bad, its technical equipment is minimal and it is very backward compared to the economic and technical development level of the country. The most important material development task for industrial law protection is development of a modern patent file or information system.

Technology Transfer

In recent times there has been no breakthrough change in trade in technical intellectual products. Table 3 shows this in figures.

Table 3.

	Import		Export	
	Percent distribution in 1984	Index 1979=100	Percent distribution in 1984	Index 1979=100
Planning	13.5	68.1	61.7	143.8
Licenses	81.4	167.6	33.1	239.8
Research, services	2.8	220.6	5.0	36.5
Organization	2.3	75.3	0.1	--
Total	100.0	137.6	100.0	141.7
Of this:				
Ruble accounting	9.7	56.7	25.2	114.1
Convertible	90.3	162.5	74.8	154.2

The import of scientific discoveries, intellectual products and new (peak) technologies is an important condition for the technical development of small countries with a development similar to ours.

In recent years we have taken and we are taking important steps to increase technology import. For example:

--a simplification and acceleration of the authorization procedures for foreign know-how and rights (licenses) representing material value;

--reducing the duties on machines, equipment and tools representing leading technology which cannot be acquired domestically or from the CEMA relationship;

--modification of the procedures and regulations pertaining to the creation and operation of mixed enterprises operating with foreign participation so that the creation of such enterprises should be more attractive to the foreign investor;

--encouraging the enterprises and cooperatives to develop further in a worthy way the foreign solutions taken over with contributions from the centralized technical development fund and with other favorable conditions.

In resolution number ATB 5021/1985 titled "Concerning Certain Tasks Serving to Strengthen the Link Between Technical Development and Foreign Economic Activity" measures were taken concerning additional tasks serving to encourage the take-over of foreign technical know-how. Implementation of the ATB [State Plan Committee] resolution is under way. In addition, studies are being made in the interest of determining additional, longer range tasks serving a strengthening of the institutional system for technology transfer and improving the conditions for it.

Marketing work must be developed much more broadly and more fundamentally than at present in the area of research and development activity as well. Innovation has a fundamental link with the market at two points. One is discovery of the needs of the market for new products, or the forecasting of such needs. This collection of information creates an important basis for starting targeted research and development and innovation. The other such point provides the end of the innovation process, in the form of "working" the market--by introducing the products and expanding market possibilities or creating new markets. To do all this we must make possible better cooperation between technical and foreign trade experts; technical experts must be brought into the market research and evaluation phase and we must do effective marketing work when developing the research and development programs (and while they are under way).

Innovation Parks

In the recent past there has developed in developed industrial countries a sort of research center, innovation parks, which link the development of inventions or new and general, high level technologies representing a new undertaking with a high level intellectual background (universities, research institutes, etc.). In many places the state and local organs have provided the infrastructure necessary for the innovation parks (buildings, public works, information and telex networks, etc.) in the interest of the economic vitalization of the areas, the investment being repaid later from taxes on the high profit enterprises and the populace. This general trend shows that research and development and swift innovation can develop better in a special, propelling environment.

Proposals have been made to create in Hungary also such islands with an outstanding infrastructure. These initiatives should be supported in harmony with the conception for R and D infrastructure development, in such a form that the research sites and undertakings cooperating in equipping an innovation center (park) can compete for support for the information system, instrument investments and experimental shops.

Innovation Manager Training

The effectiveness of innovation depends in large measure on the preparedness of the experts organizing and guiding such processes. Recognizing this various forms of innovation manager training have been instituted world-wide. We can expect the initiation and spread of innovation manager training in our country as the combined effect of processes ripening and strengthening in a natural way and of certain central efforts. The central tasks are:

--development of the basic materials needed for instruction should be aided by a modest amount of one-time central technical development support;

--a system to coordinate and encourage various initiatives (enterprise and institutional) aimed at innovation manager training should be developed;

--proposals should be developed for state institutional forms and methods for higher level--two year--post-graduate studies;

--in order to coordinate various training forms and methods it would be useful to entrust a committee under the leadership of the Ministry of Culture with central coordination (a committee made up of representatives of the MTA [Hungarian Academy of Sciences], the OMFB and the special ministries).

Innovation Financial Institutions

The creation of small banks has become necessary in the interest of a better linking together of the technical innovation chain; these provide credits not only for the R and D activity but also for the entire technical development process--thus for the related investments too in case of need. Thus far we have founded six such innovation financial institutions: the "Invest-Bank" Technical Development Bank Deposit Association; the Construction Industry Innovation Bank Joint Stock Company; the Agricultural Innovation Association Deposit Association; the Industrial Cooperative Development Bank Deposit Association; the "Innofinance" General Innovation Finance Institution; and the "Technova" Industrial Innovation Fund.

It would be desirable for the central money holders to supplement the base capital of the innovation banks belonging to them out of their own resources during the Seventh 5-Year Plan--in accordance with the needs and the possibilities.

During the Seventh 5-Year Plan the several money holders should allot a gradually increasing part of the central technical development fund with a repayment obligation (in cases where about 50 percent of the money used comes from the enterprises' own resources). Some of this should be gradually entrusted to the management of the innovation financial institutions, to the extent that the financial institutions are prepared for it. The National Technical Development Committee has used such a method for several years.

The method of the OMFB is as follows:

--Commission resources out of its own financial assets are placed with a financial institution the placement areas for which are determined by the OMFB, but a possibility is also provided that innovation projects discovered in the course of the acquisition activity of the bank can also be financed to the burden of the OMFB source--within the framework of a suitable decision mechanism;

--The director of the financial institution is regularly invited to OMFB leadership conferences where decisons are made about themes to be supported in order that themes which seem that they could be handled by a bank can be handed over to the bank for review and financing, again to the burden of the commission resources;

--The OMFB commissions the financial institution to take care of the financing of supports offered, with a repayment obligation, for the research, development, scientific and technical information acquisition and use and investment activities of various managing organizations out of the financial allowances at the disposal of the OMFB in such a way that the OMFB has the right of decision and the financial institution simply takes charge of the activity for a suitable fee.

Financing the Development

The Science Policy Committee has adopted the conception for the research and development infrastructure submitted by the chairman of the National Technical Development Committee and the first secretary of the Hungarian Academy of Sciences and the development program is now being worked out.

The modernization of the infrastructure for scientific research and technical development must be planned and implemented within the research and development financial frameworks of the Seventh 5-Year Plan. Central support can be obtained--primarily in the form of awards offered with a repayment obligation--primarily by means of a competition in order to implement the program which is being worked out, the support to come from the central technical development fund of the National Technical Development Committee set aside for this purpose and from that part of the National Scientific Research Fund (OTKA) which serves infrastructure development, the fund being handed over for management to the first secretary of the Hungarian Academy of Sciences. It is additionally desirable and necessary that the ministries and chief authorities contribute to the realization of the program to the burden of their own resources.

Sources for the modernization of the research and development infrastructure during the Seventh 5-Year Plan must be provided also from the voluntary contributions of producing and service enterprises and research institutes out of their own resources on the basis of a rational recognition of the common interest. The mobilization of the sources of the enterprises, research institutes, local councils and ministries and a coordination of their utilization must be aided by central coordination (OMFB, MTA) for the defined development goals.

After the programs are worked out in detail the National Technical Development Committee and the Hungarian Academy of Sciences will provide information about the possibilities and the competition conditions for participation in the modernization of the infrastructure for scientific research and technical development.

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